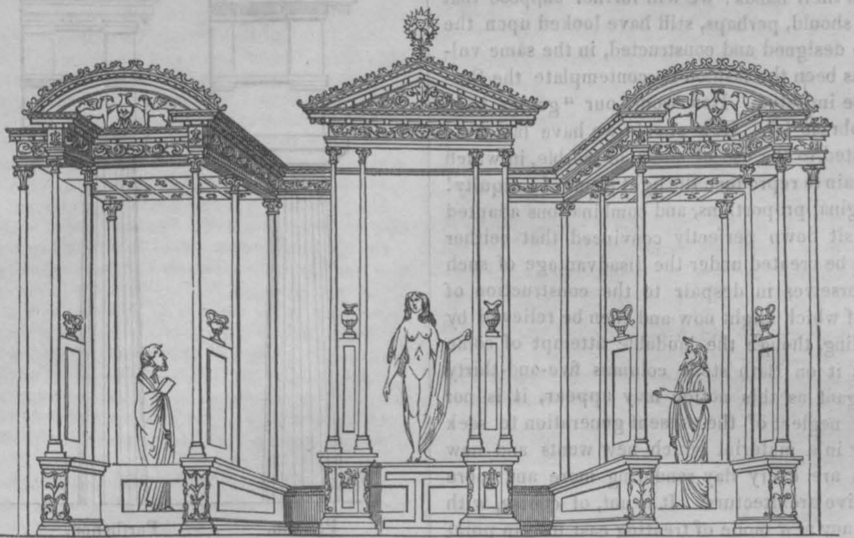
ON THE EFFECTS WHICH SHOULD RESULT TO ARCHITECTURAL TASTE, WITH REGARD TO ARRANGEMENT AND DESIGN, FROM THE GENERAL INTRODUCTION OF IRON IN THE CONSTRUCTION OF BUILDINGS.

Essay to which the Medal of the Institute of British Architects was awarded in 1842.



Decorative Architecture from the Baths of Titus.

GREAT and manifold have been the disputes on the terms beauty and taste. Right reason and sound judgment seem to enter principally into the composition of the latter quality, whether applied to morals or the fine arts, and with regard to the former, much cloudy argument may be cleared away by considering beauty in two points of view—as positive or intrinsic, and relative; the former appealing to the senses, the latter addressing itself to the understanding. The agreeable sensations arising simply from the form or colour of an individual object, is due to its intrinsic beauty. Relative beauty arises from the fitness of things—from the perception of a means adapted to an end—from the parts being well calculated to answer the design of the whole. Relative beauty, therefore, being intimately connected with utility, is that which we principally recognise in architecture. Many objects intrinsically beautiful may occupy a prominent station in an architectural composition; but although strong and abiding associations of ideas, may often render it difficult to distinguish intrinsic from relative beauty, yet it is certain that beauty is produced in architecture in the most eminent degree, by combinations of parts, none of which could justly be called beautiful if separated, and considered singly on their own merits; and it is no less certain, that the most beautiful elements of architectural composition contribute nothing to the beauty of the whole, unless properly associated. They merely become absurd, as may be seen daily in the base prostitution of the exquisite models of Greek art.

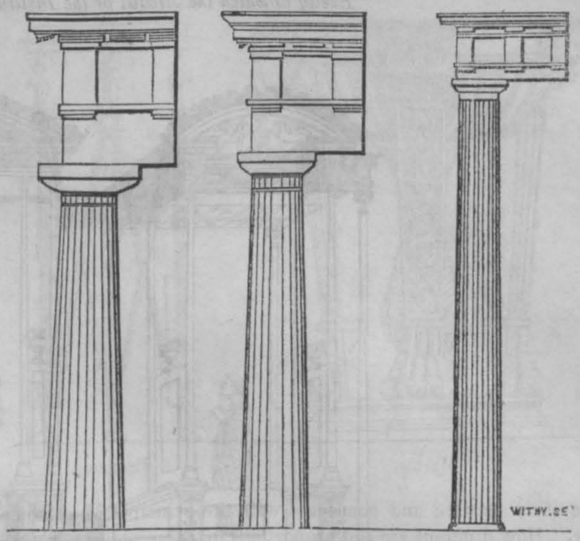
That beauty in architecture is inseparably connected with the ideas of fitness and utility, is made evident by the fact, that we acknowledge the highest degree of beauty to subsist in the most opposite extremes of taste—in other words, that the exercise of judgment and reason, which constitutes taste, leads us to consider beauty with reference to fitness and utility; and if one modification of architecture is admitted to a pre-eminence over others, it is because its fitness is the most obvious, and the means by which its purpose is attained, more simple and immediate. Whether we contemplate the architecture of the Egyptians or the Greeks, the stupendous piles of the Eternal City, the gorgeous monuments of the Gothic style, the mazy intricacy of the Alhambra, or the finished productions of modern Italy, the mind perceives, in each and all, the adaptation of the means to the end, and the development of the spirit of the age and country, in which, and for which, they were created, and these form the essential principle of the relative beauty of architecture. Now where shall we turn to find the beauty born from the spirit of our age and country, in the architecture of the 19th century? The very proposition at the head of this paper is an answer. In the 19th century we are in possession of a material in extensive operation, offering us new modes of construction, new proportions, the power of creating new forms and combinations, differing from every thing that has preceded them in art. It is now 62 years, since the erection of the bridge at Colebrook-dale first revealed the capabilities of cast iron in construction on a large scale; and during that period, science and cast iron have marched hand in hand, with strides it is amazing to contemplate. But what has *art* effected with this new power? The Institute of British Architects are still at the inquiry "what effect should result to architectural taste, from its general introduction?"! In the real adaptation of cast iron to architecture as an art, we are much where the Dorians were, when they had placed four trunks of trees in a row with a tile upon each. There the Doric order might have remained, had the Dorians been of our stamp, and there it would have remained had trunks of trees instead of cast iron been first used in construction in our time. Or perhaps the parallel will run closer, if we compare ourselves with the ancients, when they first adopted the principle of the arch, since they combined it with architectural forms already established; as we shall probably seek to do with cast iron, whenever we begin to bestow our attention upon it. After 62 years' experience, under circumstances through which a new and original style of architecture might have been developed, we are still where the Romans may have been when they built their Cloaca Maxima.

To what are we to attribute this stagnation in all our ideas, as regards art in this point of view? Doubtless, to the blind spirit of imitation and obstinate adherence to precedent (whether applicable or not, seems of little importance) which characterises the architecture of the present day. Where cast iron is to be used, the first requisite seems to be to keep it out of sight, or to make it look as much as possible like something else. To impress upon it the character of a style would be more in the spirit of the ancients, whom we profess to adore. Not that it is in the power of any man to stand forth and say, "I will invent a style." A style, like a language, must be the growth of time and circumstances; and who is to make the first essay in an age when precedent is "the be-all and the end-all," and when he who cannot command success, cares not for the higher distinction of deserving it?

The fatal effect of this spirit on our architecture might be evidenced in various ways. What has been advanced on the subject of cast iron is very far from being the strongest point in which it might be shown, but the argument must be limited to the question under immediate consideration, may, perhaps, be further illustrated by a *reductio ad absurdum.* Let us suppose that the Greeks had possessed no marble, but had known the art of casting large weights of iron, and had thought proper to use it "with regard to arrangement and design," as it *might* have been used in their hands; we will further suppose that the art had been lost; we should, perhaps, still have looked upon the monuments of antiquity so designed and constructed, in the same vulgar spirit with which it has been the fashion to contemplate the Parthenon—as something to be imitated. How would our "genius have been cramped"! (as the phrase is). How should we have lamented at finding ourselves restricted to the use of stone, or marble, in which we should have sought in vain to reproduce the light forms of antiquity! Instead of striking out original proportions, and combinations adapted to our means, we should sit down perfectly convinced that neither beauty nor character could be created under the disadvantage of such materials, and abandon ourselves in despair to the construction of bare walls, the monotony of which might now and then be relieved by the crash of a public building, though the laudable attempt of some *classical* genius to support it on Bath stone columns five-and-thirty diameters high. Extravagant as this notion may appear, it is not without its parallel, in the neglect of the present generation to seek for the elements of beauty in a material which new wants and new principles of construction are every day rendering more and more inevitable in our constructive architecture. It is not, of course, with the intention of suggesting any new mode of treating cast iron in point of art, that these observations are submitted to the Institute; but we may fairly infer that neither the ancient nor mediæval architects who have bequeathed to us inventions in art, which (lacking as we do the vivifying spirit of original thought) it cost us something even to imitate with success, would have overlooked the peculiar capabilities of a material holding so important a place in their constructive architecture, as cast iron now does in ours. Material has, in all ages and styles, performed an important part in modifying design; and it is recognised as one of the most important elements of relative beauty, as exhibited in architecture, that the real and apparent construction should assimilate, and that the soundest architecture, in whatever style, is that in which art has turned to beauty and ornament the forms and proportions dictated by necessity, or by science. Without, therefore, hazarding any new or startling problems on cast iron, or on architecture in general, it may be to the purpose to enter into some inquiry as to the use of metal in the arts, its influence in modifying design, and the purposes to which it might be applied in architecture, without losing sight of the precedents afforded by antiquity and the middle ages, to which we seem bound hand and foot.

1. Let us consider first, how far the proportions of the supports, which is the most obvious effect to be produced by the formation of a genuine style adapted to the use of cast iron, is to be reconciled with any principle derived from the works of antiquity. It will scarcely be disputed, that no proportion of parts, so long as there is a perfect accordance in the different members of any composition, is inconsistent with beauty. That this was a principle of ancient art, may be inferred from the fact, that among the numerous examples of the Doric order, which have survived from antiquity, no two present the same proportions. Nor can it be argued, that on the ground of proportion exclusively, any one is more perfect than the rest, since each must be viewed with reference to the character impressed upon it, whether tending most towards majesty or grace; and its beauty will consist in the perfect accordance between one feature and another. It was a remark of Sir John Soane, that this diversity in the antique orders of architecture, was not the result either of caprice or negligence, but of a careful study of the effect intended to be produced. Thus from the temples of Pœstum to that of Cora, the Doric column passes through a variety of proportions, ranging from $4\frac{1}{2}$ diameters in height to 9. To what proportions the architects of antiquity might have drawn out their supports, had metal entered into their construction as largely and familiarly as it now does into ours, it would be treading on dangerous ground to offer a conjecture; but that they conceived, and freely designed, in a style of architecture of extreme tenuity, when they were unembarrassed by solid materials, is evident, from the decorations of Herculaneum and Pompeii, and

Antique Doric Orders.

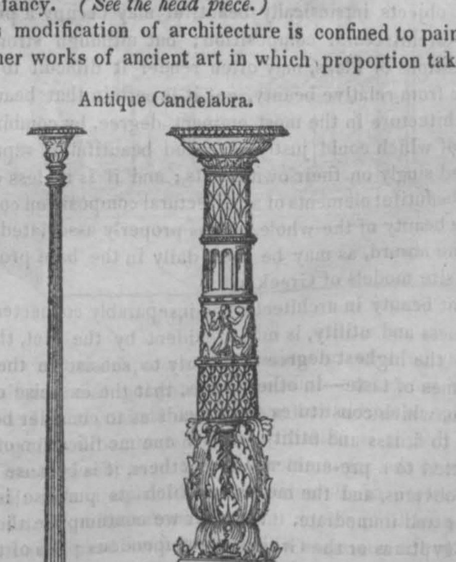


Pœstum. Parthenon. Cora.

other remains of ancient art. Nor is the architecture which the brush has perpetuated on the walls of antiquity, to be regarded as a mere *capriccio.* Throughout these decorations a great portion of the framework is architectural, and presents an assemblage of members analogous to those of regular architecture, carried out with a uniformity and consistency, which entitle these compositions to be considered as an organized style, adapted to the purpose to which we find it devoted. It is not intended by these observations, to propose that we should solidify the decorations of Herculaneum or the Baths of Titus, (though it would be easy to do worse,) but it seems indisputable, that the ancients saw nothing incompatible with beauty or good taste, in the proportions thus developed. Had it been otherwise, they would surely have avoided the semblance of architecture altogether, instead of elaborating into a regular style these exquisite creations of the fancy. *(See the head piece.)*

Although this modification of architecture is confined to painting, yet there are other works of ancient art in which proportion takes as

Antique Candelabra.



Bronze. Marble.

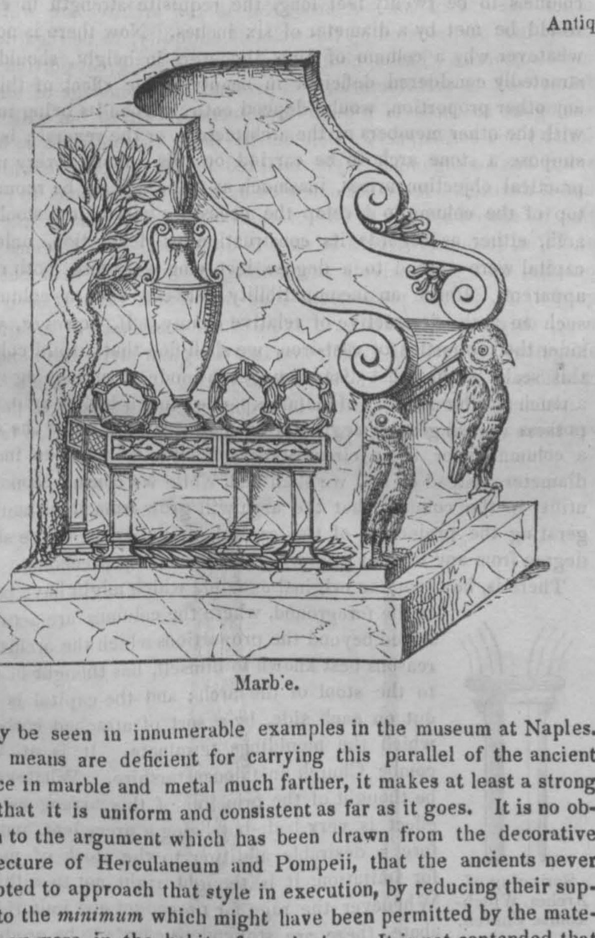
wide a range, and in which the modifications of design are to be directly traced to the nature of the materials employed, and most especially to the use of metal. The candelabra and tripods of antiquity, of which such numerous examples are extant, offer the most convincing proofs of the opposite extremes which beauty may touch,

Antique Tripods.

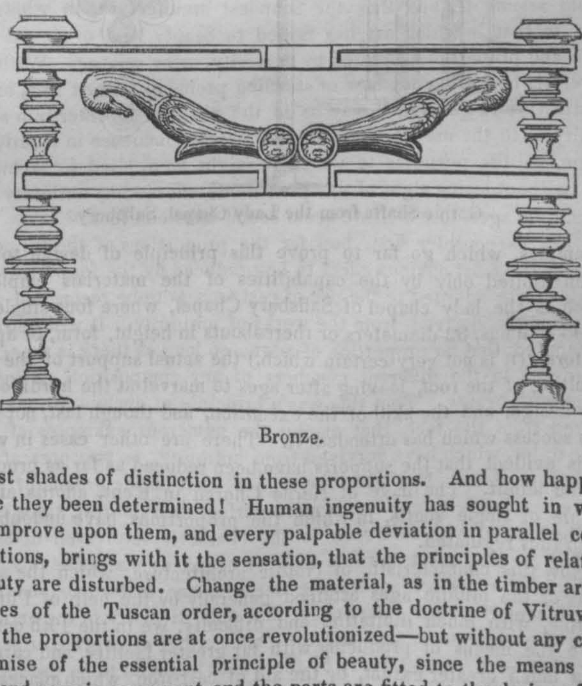
Marble. Bronze.

where it is relative and connected with the principle of reason and utility. How different are the proportions of these objects, modelled on the same general form and outline, and destined to the same offices, according to the material, marble or bronze, in which the artist has thought proper to execute them. Change the material, and the one becomes absurdly heavy, the other impracticable. And yet so little attention has been paid by the moderns to a principle which might be supposed too obvious to be missed, that it would be very easy to point out candelabra copied from antique marbles and cast in iron, without regard to the absurdity of executing the mass in metal, when designs so much more consistent with the material, and equally authorised by antiquity (since it seems indispensable to copy something) were to be had for choosing; and others might be indicated in which a better feeling, as regards the shaft, only renders more obvious the disproportions of a lumpy pedestal, substituted for the exquisite tripedal arrangement, universal in the metal candelabra of antiquity. Cast-iron, however, being so much more brittle than bronze, would require a somewhat different treatment, if considered in an original spirit. Besides candelabra and tripods, we may point to antique seats, in which the modification from the same cause is no less striking. And even in those forms, which are less open to variety from being the direct representations of natural objects, the handling is with equal skill adapted to the materials. The draperies of statues are studied with especial reference to this point; and some works of antiquity which have descended to us in marble, have been pronounced by competent authorities to be copies from bronze, on account of their peculiarity in this respect. In vases, also, there is a marked difference in the design, as the material is marble or bronze

Antique Seats.



Marb'e.



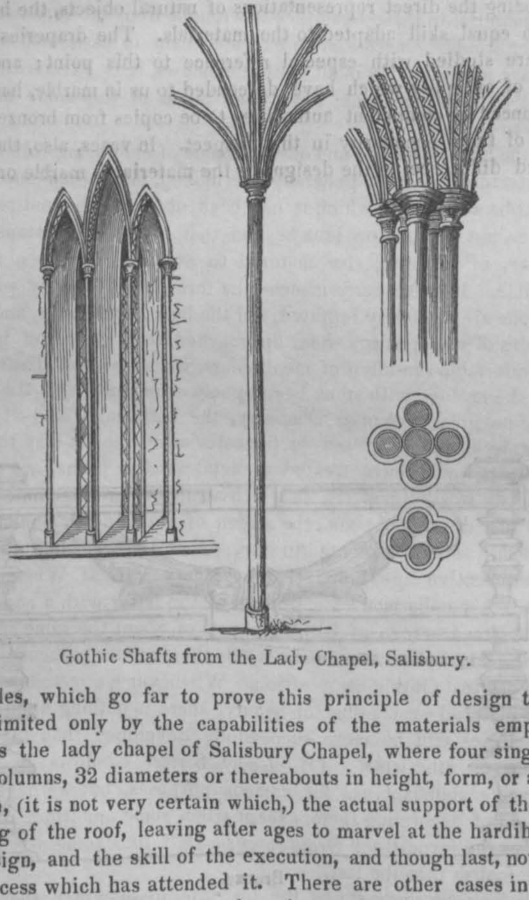
Bronze.

as may be seen in innumerable examples in the museum at Naples. If our means are deficient for carrying this parallel of the ancient practice in marble and metal much farther, it makes at least a strong case, that it is uniform and consistent as far as it goes. It is no objection to the argument which has been drawn from the decorative architecture of Herculaneum and Pompeii, that the ancients never attempted to approach that style in execution, by reducing their supports to the *minimum* which might have been permitted by the materials they were in the habit of employing. It is not contended that cast-iron is necessarily to be reduced to its minimum. The trabeated system, which is the fundamental principle of Greek architecture, and the predominant feature in the derivative style of the Romans, demanded a certain proportion between the masses which were employed for the architraves, as connected with the marble ceilings of the peristyles, the pediments, and the roof, and the columns on which they rest. We learn from Vitruvius that the ancients studied the nicest shades of distinction in these proportions. And how happily have they been determined! Human ingenuity has sought in vain to improve upon them, and every palpable deviation in parallel combinations, brings with it the sensation, that the principles of relative beauty are disturbed. Change the material, as in the timber architraves of the Tuscan order, according to the doctrine of Vitruvius, and the proportions are at once revolutionized—but without any compromise of the essential principle of beauty, since the means and the end remain consonant, and the parts are fitted to the design of the whole.

2. In considering the works of antiquity with reference to the influence of the use of metal upon architecture, we have been reduced to argue upon analogies. The consideration of another style of architecture, which divides with the *chefs d'œuvres* of Greece itself, the admiration of posterity, will afford us a much clearer view of the influence which cast-iron may exercise upon art, and what is more

without compromising the darling principle of imitation and precedent. It is indeed strange, that so little advantage should have been hitherto drawn from the employment of this material, in a style to which it so readily lends itself as the Gothic.

The principle of Gothic architecture, as opposed to the Greek, the prevalence of the perpendicular line, has been well discriminated by Rickman; and it is not to be doubted that another principle with the Gothic architects, if indeed it be not identical with the first, was the reduction of all the points of support, both really and apparently, to a minimum. This is especially obvious in the earlier style of Gothic, where the clustered shafts alculated to effect this impression on the eye, are detached from the main body of the constructive pier with which they were at a later period incorporated. Sometimes this effect is greatly increased by a combination of isolated shafts, without the nucleus of a central pier, and in the composition of subordinate parts, as in double and triple lancet windows, where the support given by the columns is only apparent, we have single isolated shafts of excessive slenderness—and there are some remarkable



Gothic Shafts from the Lady Chapel, Salisbury.

examples, which go far to prove this principle of design to have been limited only by the capabilities of the materials employed. Such is the lady chapel of Salisbury Chapel, where four single isolated columns, 32 diameters or thereabouts in height, form, or appear to form, (it is not very certain which,) the actual support of the main vaulting of the roof, leaving after ages to marvel at the hardihood of the design, and the skill of the execution, and though last, not least, the success which has attended it. There are other cases in which it is evident that the supports have been reduced as far as prudence would admit. The nave of Herne Church in Kent, affords an example of single shafts, in which the proportions have undoubtedly been thus regulated.

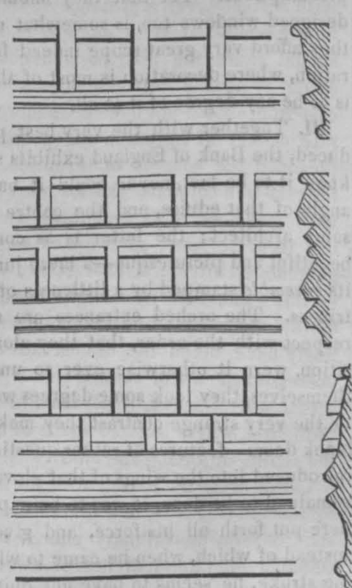
Now this characteristic of Gothic architecture, which the architects of the middle ages attained generally by the help of Purbeck marble, with much limitation and difficulty, we in the 19th century have the means of producing with far greater facility, and carrying to a much greater extent, by the aid of cast-iron, which places it in our power to arrive at a degree of lightness, of which the Gothic architects could only dream, though they made bold efforts to realise it; and it does appear most extraordinary, considering how popular Gothic architecture has become, and how well its details are understood, that so few attempts should have been made to render iron available for the combined purposes of construction and beauty. On the former consideration, it has sometimes been used, but either in disguise, or with economical views only, in the naked deformity of a mere post or joist, without relation to the fitness of the whole, and with scarcely even a pretence at architectural character. Considering how essential it is in modern churches that the internal supports should cause the least possible obstruction, it is strange that the peculiar sympathy between obvious utility, Gothic architecture, and cast-iron, should not have been more diligently studied. The inveterate canker of imitation and precedent, has in this case as in others, poisoned the sources of invention. There is no original precedent for cast-iron columns, and we must therefore persist in building them with stone, or with something which is to pass for stone; or if we use iron, we must give up as impracticable all attempt to give it a genuine architectural character. We may with certainty pronounce in this case, that iron might be used strictly in the spirit of the Gothic architects; and it may even be affirmed that they would willingly have taken the utmost advantage of this material had they possessed the art of casting it. If a precedent is yet demanded, the actual use of metal, if not iron, in columns, may be seen in Exeter Cathedral, where isolated shafts of brass enter into the composition of the sedilia adjoining the altar.

Let us bring the search after the *kalos* in the construction of Gothic columns in cast iron, to a practical test. The weight of the clerestory and roof on an ordinary church of forty feet high or thereabout, standing on lateral arches of eleven or twelve feet opening, may be about twenty tons on each column, and supposing the shafts of the columns to be twenty feet long, the requisite strength in cast-iron would be met by a diameter of six inches. Now there is no reason whatever why a column of forty diameters in height, should be abstractedly considered deficient in beauty. The effect of this, as of any other proportion, would depend entirely upon its being in unison with the other members of the architecture, or the reverse; but if we suppose a stone arch to be carried on this column, a very material practical objection arises, inasmuch as there will not be room on the top of the column to develop the necessary bulk of the stool of the arch, either as regards its construction or decoration, unless the capital were spread to a degree involving weakness, both real and apparent. Hence an incompatibility between such a column, and such an arch, destructive of relative beauty. If, however, we consider the properties of cast-iron, we shall find that a solid column on this scale is the most disadvantageous mode of employing it, since a much smaller quantity of metal expanded into a hollow cylinder will possess a much greater degree of strength. If we make the shaft of a column under these circumstances twelve or fourteen inches in diameter instead of six, we shall find, while we consult economy and utility in the column, that the arch will grow from it without exaggerating the projection of the capital, or departing in the slightest degree from any form or proportion authorized by precedent.

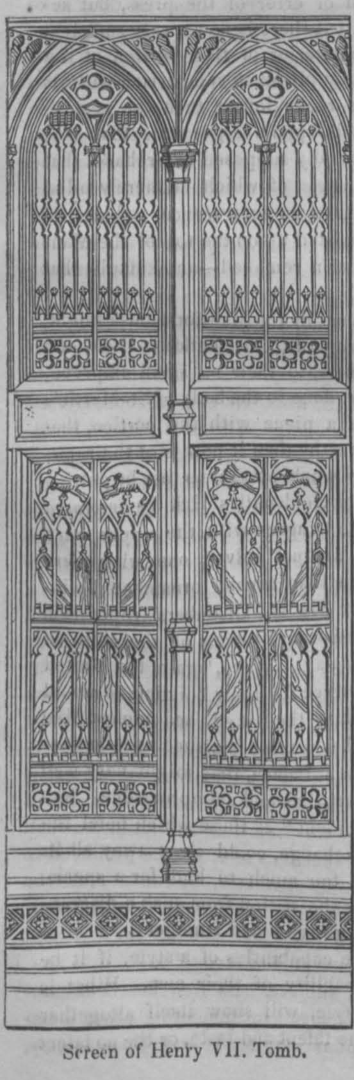
There is, however, an original example which might have been put in the foreground, where the columns are actually reduced beyond the proportions which the architect, for reasons best known to himself, has thought fit to give to the stool of the arch; and the capital is pieced out on each side, by a sort of attached corbel upon which the mouldings terminate. It is at Winchcombe Church in Gloucestershire. Whatever may be thought of the principle of this arrangement, the effect is very bad, but being a precedent, and therefore a desirable addition to the stock of materials for imitation, it is thought right not to withhold it. Whenever the rage for precedent and imitation shall abate, there are stupendous effects to be produced in architecture, especially of the Gothic character, by the use of iron columns; but it must be when the material is recognised to be legitimate, and not cased with deal, or "painted and sanded," or "jointed and coloured," as the price books have it, "as stone."

Springing of Arches, Winchcombe Church.

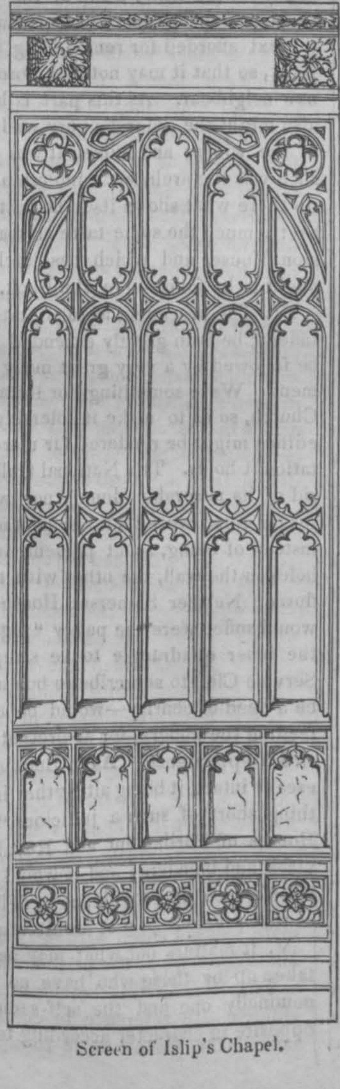
Thus far, in this branch of the subject, cast iron has been considered with reference to columns only. In subjecting other members of the Gothic style to a similar inquiry, it will be necessary, since we are arguing upon precedents, to argue with more caution, as precedents become less obvious. We may learn, from a comparison of carvings in stone and wood, how completely the mode of treatment varied with the material in Gothic as in classical art, and especially how well the relief of the ornamental parts of the work, was proportioned to the bulk necessary to the self-support of the substances employed. The skill with which a considerable variety of moulding and outline, and an effective distribution of light and shade was produced in wood without employing unnecessary thickness of material, or exposing a high relief to the destroying action of the weather, is not one of the least remarkable instances of the ability of the Gothic architects, nor the least worthy of careful examination by their imitators, some of whom have nevertheless studied to bestow upon woodwork, all the amplitude of relief to be found in precedents executed in stone. From the practice of our masters in this respect, we may safely infer, as we have done before, that they would have displayed equal skill in devising new proportions and new modes of treatment for iron, had they applied it to as many and as important purposes in construction, as might be devised and executed at the present day.



Gothic Mouldings in wood.



Screen of Henry VII. Tomb.



Screen of Islip's Chapel.

Such purposes and modifications, it must be repeated, it is not the intention of the present essay to suggest; but the inference is not one of mere conjecture, since we actually possess works of art of the middle ages in metal, legibly stamped with the peculiar influences of the material, to which sundry modern attempts to Gothicize in cast iron are very unlike indeed.

Before we proceed to more elaborate works, it is worth while to point out the various patterns in which the iron and lead work is disposed, in the windows of the early Gothic. A series of these designs will be found in Carter's Ancient Architecture (Part I, plate 79). It is true that these forms are subservient to the display of stained glass, but, independently of the glass, they are worthy of consideration and study. At the Sainte Chapelle at Paris, the iron work rivals the tracery of later times in the variety and richness of the patterns. The material in these examples is wrought iron, but very little modification would be necessary to execute them in cast, and since iron bars are indispensable in all Gothic windows, it is extraordinary that so little advantage should have been taken of this mode of turning them to account.

Although this simple and obvious mode of employing iron in Gothic architecture has been generally overlooked, more than one instance might be adduced in which it has been used for the entire window frames, but without any idea beyond that of imitating stone; that is to say, of adapting the material to as inappropriate a model as possible. In these performances the forms furnished by precedents in stone are so closely imitated, and the bulk of the parts, and relative breadth of the openings so far approached, that the result is a most uncomfortable sensation of meagreness, weakness, and disproportion. Had the analogy with stone been openly abandoned, and the supports made no greater than is necessary, the material would at once be recognized, and the mind so far satisfied. In what way the Gothic architects would have treated a metal window frame, we may infer from two works in metal, in which analogous architectonic combinations are developed; viz., the screen of Edward IV.'s monument at Windsor, actually executed in iron, (what can precedent do more for an uninventive age?) and that of Henry VII. at Westminster, in brass. A comparison of a portion of the latter with a compartment of the stone screen of Islip's Chapel, of about the same superficies, will explain better than many words the peculiar influence of metal, upon original Gothic composition. Whenever we recognise cast-iron as a material susceptible of beauty, there is nothing upon which its capabilities will be more successfully developed than in windows, Gothic or otherwise. Of closely barred windows and *grilles*, we make abundant use for various purposes, but we have scarcely thought of decorating them, except when some ambitious ironmonger presses the favourite "*Greek honeysuckle*" into some new invention, more foolish than the last.

The subject proposed by the Institute, upon which the foregoing observations have been offered, is one of the greatest importance in the present state of the arts and sciences in England. The modes in which it may be discussed are many; and valuable hints in architectural composition might be elicited, if it were proposed with the object of studying the capabilities of the material, and suggesting modes in which they might be made available in art as well as in science. In the preceding remarks, it has been taken in a single point only. The general argument on the effect of material upon design might be extended, without perhaps digressing more than might be allowable, and the modifications of our native architecture in the chalk and rubble churches of Kent—the decorative flint-work of Norfolk and Suffolk—and the different treatment of the detail, in the contemporaneous structures of the counties of Lincoln and Gloucester, contingent upon the quality of their stone, would afford ample and decisive examples bearing not too remotely on the main subject—but all this is too extensive and important to be treated in a mere digression. It is a vice of the present school of architecture to neglect obvious and natural resources in construction, to produce showy falsities, and to be ashamed of sound realities. To support this proposition would lead to another dissertation, but it would be unjust to conclude without qualifying the general observations already made upon this tendency, by admitting that there are many honourable exceptions. To select examples would be invidious, but it may be allowable to mention what has appeared in print, and it would be throwing away the advantage of a powerful support to the argument which has been pursued, not to refer to the letter on ecclesiastical architecture, addressed to the Bishop of London by Mr. John Shaw.

The most considerable attempt ever made to connect cast iron with architecture, as an art, is the construction of the new spire of Rouen Cathedral. In this work, the proportions have been carefully adapted to the material; whether the object sought has been as well attained as it might be is not now the question. The endeavour is laudable; and as we flatter ourselves that in a knowledge of Gothic architecture, at least, we have the advantage over our neighbours let us try to produce something more satisfactory.

CANDIDUS'S NOTE-BOOK.

FASCICULUS LII.

> "I must have liberty
> Withal, as large a charter as the winds,
> To blow on whom I please."

I. It is with naked windows as with naked figures—the latter may be either innocent enough or grossly indecorous, just as they happen to be introduced. Put a naked figure, that may be unexceptionable in itself, into a picture where other figures are clothed, and it becomes an indecency—of which, by the bye, there is an instance which had better have been omitted, among the cartoons in Westminster Hall, where *sans-culotte* gentlemen in *puris naturalibus* "cut a figure" alongside of others who are in breeches. As to windows, the rule should be, if you can't afford clothes, that is, "dressings" for them all, bestow them on none. It does not, indeed, follow, that all are to be dressed alike, or in the same degree, for some may be comparatively in undress; but between undress and a state of nudity there is some little difference. It is nothing less than a positive violation of the ordinary and most obvious proprieties of architectural decorum, to give dressings to the windows of the principal floor only, and leave all the others absolutely bare. Yet how frequently is this done! which being the case, we must suppose that it is admired as producing at least a *smartish* look—something of would-be consequence, like that of those unhappy people who affect to be above their own class in society, yet can get into no higher one, and so render themselves objects of ridicule to both. Another most tasteless practice is that of sticking in columns and pilasters between windows which have no dressings, or if any at all, such as are by no means sufficient to produce consistency of character. Yet it is of such bungling vulgar stuff that the architectural "magnificence"—so the penny-a-line critics call it—of Regent Street, and Regent's Park palaces, and of Pimlico and Paddington, is made up. This is the sort of stuff which, as Welby Pugin—who does not always cull his words for ears polite—says, "absolutely make us *spew* to look upon them"; whence it may be supposed that John Nash and his school must have caused many a dreadful fit of landsickness.

II. Surely architects have an excellent right to claim Mercury for their patron, as being the God of Thieves. Not content with stealing ready-made orders and columns, they generally pilfer almost every thing else, till sometimes there is nothing whatever in a design they can fairly lay claim to as their own, except the tastelessness with which they botch together their stolen ware. For their not exercising their invention at all in regard to columns, the excuse is that they are things by far too precious to be "tampered with," and even the idea of attempting—not to produce a fresh order, but to modify the standard examples of the orders, so as to produce others, is reprobated as presumptious. Yet that they should almost invariably steal ready-designed windows too, is somewhat unpardonable, more especially as they afford very great scope indeed for diversity of design and decoration, where decoration is most of all imperatively required, if there is to be any degree of it at all.

III. Together with the very best piece of design Soane ever produced, the Bank of England exhibits some of his worst. Did we not know it to be fact, never could it be imagined that the north-west angle of that edifice, and the centre of the south front, were by the same architect; the latter is as complete a failure as the other is beautiful and picturesque—a mere jumble of ill-assorted parts, and in its *ensemble* stamped by a littleness of manner amounting even to paltriness. The arched entrances are so utterly at variance in every respect with the order, that they alone would disfigure the composition, were it otherwise ever so unexceptionable. Bad enough in themselves, they look some degrees worse than they else might, owing to the very strange contrast they make with the large square-headed blank doors—features of rather questionable propriety in themselves—introduced into the wings of that elevation. So long as this centre part remained to be done, it was to be expected that the architect would here put forth all his force, and give us a veritable *coup de maitre*. Instead of which, when he came to what ought to have been his finishing stroke, he seems to have got quite to his wit's ends, and to have been left without an idea. Fortunately this portion of the façade will look more miserable than ever now that it is brought into close proximity with the portico of the new Royal Exchange: nor is "fortunately" here either a slip of the pen or error of the press, but seriously meant, because it is fortunate that there is now a very sufficient pretext afforded for remodelling the exterior of that portion of the Bank, so that it may not look absolutely pitiful in comparison with its new neighbour. As this part is here really loftier than the rest, so also might the order be very well made upon a larger scale than that of the wings; and indeed it was generally supposed beforehand, that such was the architect's intention; instead of which he merely piled up there what shows itself no better than an excrescence, and one in pretty much the same taste as that hoisted up on the top of the Mansion House, and which has lately been removed—an example that ought to be followed by the Bank.

IV. The precedent as to alteration set by the Mansion House might, indeed, be both greatly extended in regard to that building itself, and be followed by a very great many others, to their no small improvement. Were something, for instance, done to the body of St. Martin's Church, so as to make it tolerably of a piece with the portico, that edifice might be rendered far more worthy than it now is of the reputation it holds. The National Gallery would sustain no loss by getting rid of its miserable dome; nor would Goldsmith's Hall be *improved for the worse*, were its lower part made to agree with the upper part, instead of being, as at present, two distinct halves, one with mere holes in the wall, the other with more than usually ornamented windows. Neither Somerset House nor Sir W. Chambers' reputation would suffer were the paltry "pigeon-house" turrets on the sides of the inner quadrangle to be swept away. Were, again, the United Service Club to subscribe to buy a cornice for their building, it would be a deed of charity—would be clothing the naked, and almost like feeding the hungry, for at present it has a most famished and famine-struck appearance. As to Buckingham Palace, that might very well escape intact, it being altogether incorrigible and unimproveable. Nothing short of such a judicious "accident" as those which befel the Houses of Parliament and Royal Exchange, could clear away all its vices and blunders; and it would be too much to look for a special interference of Providence to deliver the nation from such a disgrace as that precious pile of architectural gewgaw and trumpery.

V. It matters not what may be the capabilities of a style, if it be taken up by those who have no capability of their own. What is nominally one and the self-same style, will show itself altogether opposite in character according to the talent and taste, or the no talent and no taste, brought to it, a remark which I have already made more than once before, but one which cannot be repeated too often. Of the Italian style and of the very same species of it, we meet with very striking contrasts in Barry's two club-houses in Pall Mall, and the Club-house Chambers in Regent Street. The difference as to quality and taste between the latter and the two former is hardly to be expressed, for it does not amount to much when stated in words, nor can it be indicated further than by vague, qualifying epithets. In the two Pall Mall examples we perceive a refined elegance, and a most captivating simplicity produced by what most people seem to imagine opposed to simplicity, namely the most patient study and careful elaboration of every part, even to the minutest details. There is no one part that is overdone in proportion to another; no one that is underdone. Every thing is in its proper place, and contributes to the beauty of the ensemble. There is nothing you would wish either to add or take away. Eminently beautiful in themselves, the individual features acquire redoubled charm, from the felicity with which they are combined. The Regent Street example, on the other hand, is almost the direct reverse: while it is very far from being free even from decided blemishes that might be easily pointed out, its general inferiority lies in numerous particulars and circumstances, which hardly admit of being described or pointed out, except *viva voce* with the building before one. One great defect is, that the whole looks too much squeezed together, and is consequently deficient in repose; nor is it less so in regard to richness, notwithstanding that this last seems to have been aimed at by the variety of parts—which, however, are all poor in themselves. I have heard it pretended, that the predominating characteristic of Barry's Italian style, is the cornicione: let those who fancy so, try it, and they will soon find out their mistake. There is no deficiency of cornice in the façade of the Clubhouse Chambers; but a most terrible deficiency of other merit. It is to Barry's two designs, what a very ordinary pippin is to a pineapple.

VI. One great merit of Barry, as strikingly exemplified in the two buildings above-mentioned, is that his detail is his own. Every part of it appears to have been expressly studied and devised for the actual occasion; whereas in general, even where better than usual in itself, detail seems to be taken from books or other authorities, and applied without the slightest modification, and in such manner, perhaps, as to be rather injurious upon the whole, by causing all the rest to appear in very inferior taste. Some will then, probably, ask, what is the service of purchasing expensive architectural publications, if we are not to be allowed to borrow any thing from them?—the borrowing, by the bye, meaning nothing else than stealing—which by some is practised in so barefaced a manner, that they do not even pretend to design their own details at all, but set their clerks to copy it from prints and books. The use of such examples is to study them, to form one's taste upon them, to learn to discriminate between what is excellent and what defective in them, and so to profit doubly by imbibing the true spirit of the former, and avoiding the latter. The use of such lessons, is to derive ideas from them, therefore they are not likely greatly to benefit those who stand most of all in need of such aid; it being a well-known fact, that those who have fewest ideas of their own in their heads, can find least room there for those to be got from other people.

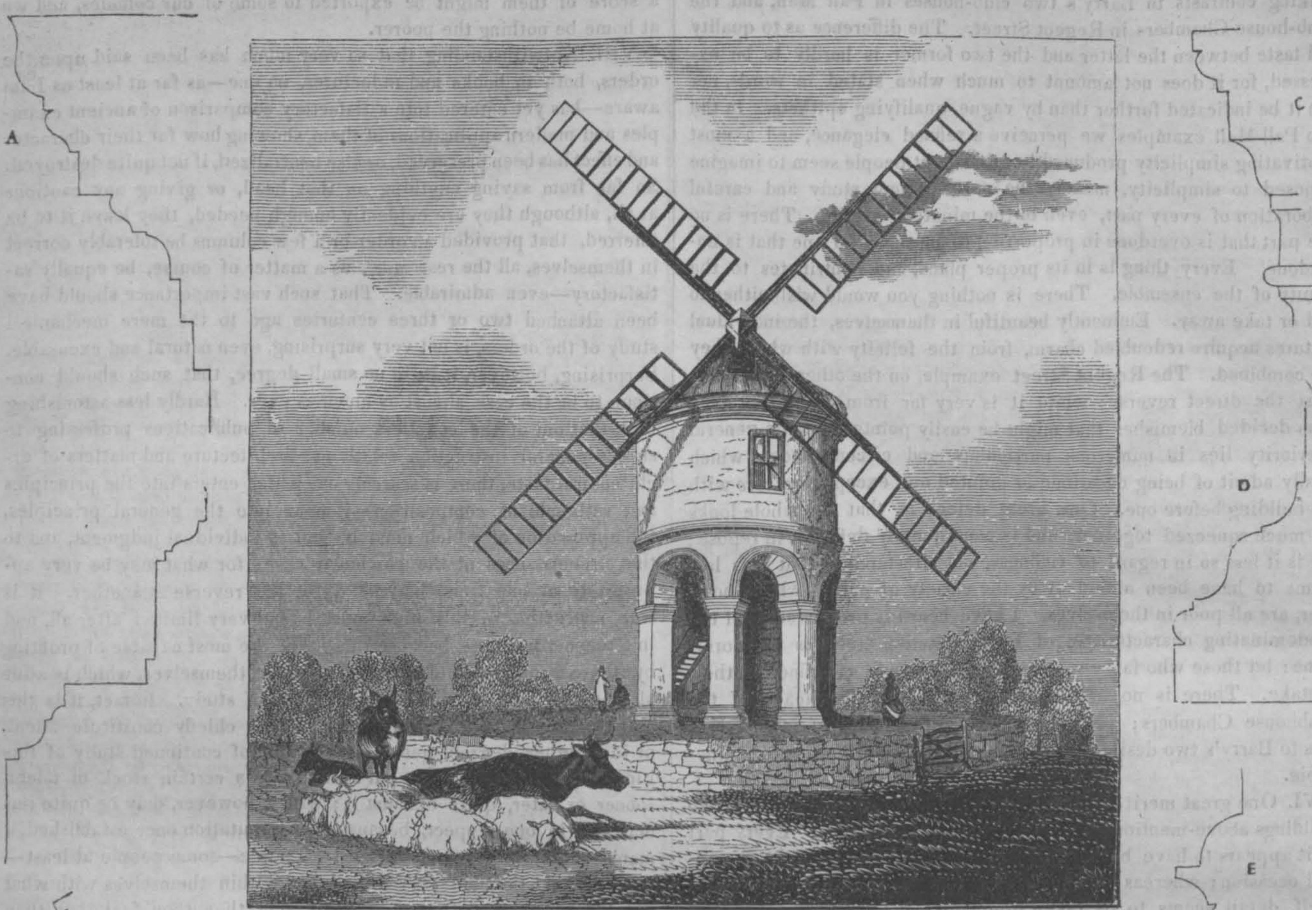
VII. It is to very little purpose for any one to attempt making a stir about the British Museum. The case is altogether a desperate one; and nothing remains for us, but to submit with graceful resignation to what must be, and to what fate—in the person of Sir Robert Smirke, irrevocably decreed long ago, shall be. It is true, circumstances have greatly altered since his Post Office was hailed by the newspapers as a most classical piece of architecture, at which time there was scarcely any other channel for architectural criticism, or the expression of opinion in regard to it, than the columns of a newspaper, which were likely enough to entertain sympathetic admiration for the columns of the great architect in question. Yet, if there has been some change in that respect, there has been none in Sir Robert; as for the matter of that, why should there be any, since he long ago attained such perfection, that to look for further improvement would be most unreasonable? To say the truth, he has given so many examples of the same sort of excellence over and over again, that half a score of them might be exported to some of our colonies, and we at home be nothing the poorer.

VIII. Notwithstanding that so very much has been said upon the orders, both in books and in lectures, no one—as far at least as I am aware—has yet entered into satisfactory comparison of ancient examples and modern applications of them, showing how far their character and effect has been preserved, or else neutralized, if not quite destroyed. So far from saying anything on that head, or giving any cautions at all, although they are evidently enough needed, they leave it to be inferred, that provided an order or a few columns be tolerably correct in themselves, all the rest *must*, as a matter of course, be equally satisfactory—even admirable. That such vast importance should have been attached two or three centuries ago to the mere mechanical study of the orders, is not very surprising, even natural and excusable. Surprising, however, it is, in no small degree, that such should continue to be the case almost as much as ever. Hardly less astonishing is it, that out of the countless number of publications professing to supply general instruction relative to architecture and matters of architectural taste, there is scarcely one which enters into the principles and rationale of composition—I mean into the general principles, the application of which must be left to individual judgment, and to the circumstances of the particular case; for what may be very appropriate at one time, may be quite the reverse at another. It is true, instruction of this kind must be but very limited after all, and in a manner needless, because those who are most capable of profiting by it, are also capable of working it out for themselves, which is after all, the very best and most efficient mode of study. In fact, it is this sort of study and the capacity for it, which chiefly constitute talent, or in a higher degree, genius. For want of continued study of this kind, even those who set out at first with a certain stock of talent, sooner or later, quite exhaust it; which, however, may be quite immaterial in one respect, because, his reputation once established, a man's ability is taken upon trust. People—some people at least—may feel that they are very dissatisfied within themselves with what has the recommendation of a name; but then they feel that they ought to doubt their own judgment, or at all events do not care to seem to swim against the stream, and accordingly with the discretion of timidity, leave the world to find out the humbug in its own good time, which it generally does, as witness "the great Mr. Wyatt," now transformed into "James Wyatt, of execrable memory."

IX. Poor Sir John Soane!—now to be made after all an object of posthumous abuse, by the very man who was constantly toadying him in the most servile manner while he was alive! Yet so it is. The censure may be merited; the suppressed work of his alluded to, may be such that no one can "conscientiously compliment the author or the man;" but supposing that character of it to be perfectly just, it is any thing but creditable—absolutely disgraceful to the other party, that entertaining such opinion of Soane, he should all the while have professed the greatest admiration and respect for him, and have eagerly seized hold of every opportunity, and even the slightest pretext at all for doing so. Instead of vindicating his "much esteemed friend's" professional character from any of the numerous aspersions that have been thrown out against it, he makes himself an opportunity for aspersing his moral character, raising suspicions all the more prejudicial, because, the work itself being suppressed, and no copy of it even in the British Museum, it cannot be ascertained how far it really deserves the reprobation so very pointedly implied. That the quondam most obsequious admirer of Sir John Soane should now become his traducer, is indeed startling; but of the two, Soane showed the greater discretion, for he suppressed his obnoxious work, whereas the other has been so absurdly indiscreet, as to let it now be seen what was his real opinion of a man whom he may be said to have worshipped in public.

WINDMILL IN WARWICKSHIRE.

BY INIGO JONES.



REFERENCE TO MOULDINGS.

A, Cornice, top of mill. B, Moulding to window head. C, Impost moulding of piers. D, Base mouldings of piers. E, String course above arches. F, Archivolt or arch moulding.

A true master mind is to be recognized not only by its great works, but by its slightest and least important attempts. In particular to the artist should apply the motto, *Nihil quod tetigit non ornavit*, the same general principles of taste regulate details as regulate a grand design. We certainly must confess that some of our prominent examples of architectural proficiency recognize this rule, but on opposite grounds; with them the same frigidity and the same slovenliness prevail in a palace as in a workhouse, and the same absence of art is to be recognized in each. We do not mean this; on the contrary, we want to see the true artist exhibit himself in every performance, for negligence in details can scarcely ever accompany the grand in design; in fact, we have ever found that master minds were those of the most extended information as to minutiæ. The mind of Michael Angelo took in the whole range of art in all its variety of practical manipulations; Napoleon and Wellington, in the midst of their vastest schemes of conquest, knew how many pairs of horses' shoes each trooper had in reserve, and how they ought to be made; Homer and Shakspere have shown the greatest acuteness of observation in whatever affected their compositions. Is it to be supposed that those possessing such powers of observation, and exercising them so constantly, would consider it worthy of them to sloven over the details of their own profession? Architects and architects' employers, we are sorry to say, too often think otherwise, the *mens divinior* is some cabalistic idol only to be brought forward at jubilees, or in times of some public excitement, not to be exerted and exhibited on every occasion. Such was not the feeling of our Greek, our mediæval masters; the Athenian vase, the tomb, the weapon, at once reveal their classic origin; the smallest works of the middle ages show how deeply rooted was the love of art, the same in the least piece of church furniture as in the glorious pageant of the minster itself. Such was not the feeling of our own great masters; the works of Inigo Jones and Christopher Wren afford as many points of study in their details as in their general aspect. Above we have given a representation of a windmill [1] by the former of these eminent men, a design showing how well he could bring his resources to bear on what is generally considered such an ephemeral and trivial occasion for their exercise. This work is in Warwickshire, and it will be seen that the mill is raised on a basement of six arches, which contains the mill stairs. The cornice at the top of the mill, the impost moulding of the piers, the base moulding of tne same, the string course above the arches, and the archivolts, show that he has not been negligent of due and effective ornament. It is a study which many of the present day may contemplate with advantage. Simple yet ornate, not exaggerated in character, not overstepping the modest bounds of propriety, and yet giving a picturesque contour well adapted to the situation in which the object is placed.

[1] For this engraving we are indebted to our contemporary, the *Builder*.

THE BRITISH MUSEUM.

Sir—Happening to visit the British Museum yesterday, I have set down a few remarks which you will perhaps give in your *Journal*, as supplementary to the paper on the subject of that edifice in your last number.

The old building is, I find, *in statu quo* as to appearance, for that façade has not yet begun to be taken down, but internally there has been a good deal of work carried on, through which a temporary boarded up passage leads from the hall to the Townley Gallery. Here havoc has begun its work, for one of the tasteful little rotundas in that suite of rooms has been cut nearly in halves, preparatorily to its final demolition. Those rooms were, it must be owned, rather too confined, considering that the Museum is open to a sometimes thronged concourse of persons; still, it is to be regretted that they could not be spared, for they are not likely to be replaced by what will be more attractive in point of architectural character. Of the Lycian or Fellowes' marbles, I will only say they are not worth a tenth part of the fuss that has been made about them, most assuredly not worth sending out an expedition to secure more of them. Should the Lycian mania continue, we may expect counterfeit antiques, equally precious, to be manufactured on the continent and imported into this country. But look there! there is *the* very thing! a real treasure, and a specimen of art that Sir Robert Smirke ought to go down on his knees to! Excuse the harum-scarumness of my manner; I am not quite mad—merely a little flighty or so. "There," said I to myself, "if Sir Robert does not make something of that, he himself ought to be made into a mummy, and sent to keep company with the mummy gentry up stairs." However, it is of no use to go on rambling at this rate, for until I explain, you will hardly guess what I am driving at. Of course you are aware of Sir Robert's penchant for columns with Ionic capitals; he has favoured us with a vast many in his time, but with scarcely two good specimens out of the whole number, forgetting that it is possible to have too much even of a really good thing. Invention is, of course, not to be thought of; for were he to give us a fresh idea of his own for any such purpose, good as it might be in itself, it would excite a hubbub against him from all the orthodox, and the classical puritans; yet he has no occasion to invent, but merely to adopt, for his façade to the British Museum, what is in the Museum itself, consequently its legitimacy can be proved on the spot. All this, you will say, is sheer rigmarole; true, and here comes the solution of it. What I am alluding to is the bold and rich antique voluted capital, on each of whose four sides or faces is sculptured a mask in full relief—a well imagined composition, and, as it seems to me, one highly appropriate for such a building as a museum, as the display of sculpture in the capitals would serve to indicate that the edifice is partly devoted to the purpose of a public sculpture gallery. Or, shall we say that external character is of no consequence, since "good wine needs no bush."

In sober seriousness, what are we to have from Sir Robert Smirke on this important occasion? What we may expect from him we too well know; but surely he will not now be allowed to go on as he has hitherto done—at least, without strong remonstrance on the part of those who, like yourself, have the means of calling attention to the subject.

I am, &c.,

C. Whyte.

ENGINEERING IN NORTH AMERICA.

Sir—I take the liberty of requesting from some of your readers a statement of the great public works which have been executed in Great Britain or Ireland, under the direction of Mr. Hamilton H. Killaly, Chairman of the Board of Works in Canada; also a reference to any reports made by him, or papers on scientific subjects which he may have contributed.

The late Governor General, in a despatch to Lord Stanley, dated Quebec, 19th July, 1842, speaks of "Engineers of great experience and scientific acquirements, who, being strangers to the country, can have no local bias;" and Mr. Killaly "believes" that "the Governor-General must principally have alluded" to him, (p. 65, and questions 383 and 391, p. 40, Ev. Beauharnois Canal, a copy of which you have.)

The proofs of the "great experience and scientific acquirements" must therefore be sought for across the Atlantic; and though tolerably familiar with, as I supposed, the names of all the eminent British engineers, and of many of the residents even, I never met with the name of Hamilton H. Killaly among them; nor did I find an individual more fortunate among my Canadian friends—including some of the first gentlemen in the province—nor in a numerous professional acquaintance here.

This explanation will, I hope, be sufficient to justify the course I have taken; and I trust there can be no impropriety in my requesting, or in any gentleman giving, the desired information, as to Mr. H. H. Killaly's "great experience and scientific acquirements."

I am, Sir, &c.,

W. R. Casey.

P.S. I take this opportunity to request the insertion of the following note.

Note to article on "Canadian Board of Works," Journal, Feb. 1843.

The length of the locks on the Welland Canal has been increased to 150 feet, "principally by representations from the merchants and forwarders of Oswego," as officially announced. This is in accordance with my view, that the Welland Canal is quite as much a New York as a Canadian work, onus of cost, and risk of income excepted.

Speaking of the income of the Lachine Canal, a late Montreal paper says, "Downwards the falling off in the transport is most serious, the steamers and most of the barges running the Lachine rapids, to save canal tolls and towage." The Cornwall Canal, around the Long Sault, was opened for a short time, large steamers using it upwards, but descending the rapids. A serious breach has just occurred, and it must be viewed as a very uncertain work for some time. The tolls on the Rideau Canal have been increased, and, in answer to a remonstrance, it was observed that the tolls on that canal should not be so low as to direct all the trade from the St. Lawrence—a novel mode of improving the communication. Lord Stanley's Bill puts the trade, *via* the St. Lawrence, on a somewhat worse footing than hitherto, about 2*s*. per quarter of wheat. I omitted to observe in the paper to which this *Note* refers, that of £320,000 appropriated for common roads, £75,000 only are to be expended in the lower province, containing two-thirds of the population, and the commercial wealth of the country; whilst £170,000 are to be expended in or in the immediate vicinity of the district, represented by the Chairman of the Board of Works.

Time is rapidly and only too fatally confirming the views contained in my communication of February. The present policy, by connecting in the public mind the engineer with the political jobber, does vast injury to the profession; brings in its train taxation on all classes; odious restrictions on the business of forwarding; and will effectually prevent the settlement of the province, by frightening the emigrant to that part of the "far west" where no public debt exists.

W. R. C.

By a typographical error the width of the locks on the Lachine Canal was stated to be "30" instead of "20 feet," the present width. The rate of insurance (in one of the notes) should be "three-eighths of one per cent."

SCREW PILE LIGHTHOUSE, AT FOOT OF WYRE.

Sir,—It having frequently appeared, not only in the newspapers and other publications of the day, but also in the report of evidence before Committees of the House of Commons, that the Screw Pile Lighthouse at foot of Wyre, was erected by Captain Denham, R.N., F.R.S.E, &c., you will oblige me by giving insertion to the following letter, addressed to me by that gentleman, inreply to a remonstrance on my part.

Alex. Mitchell.

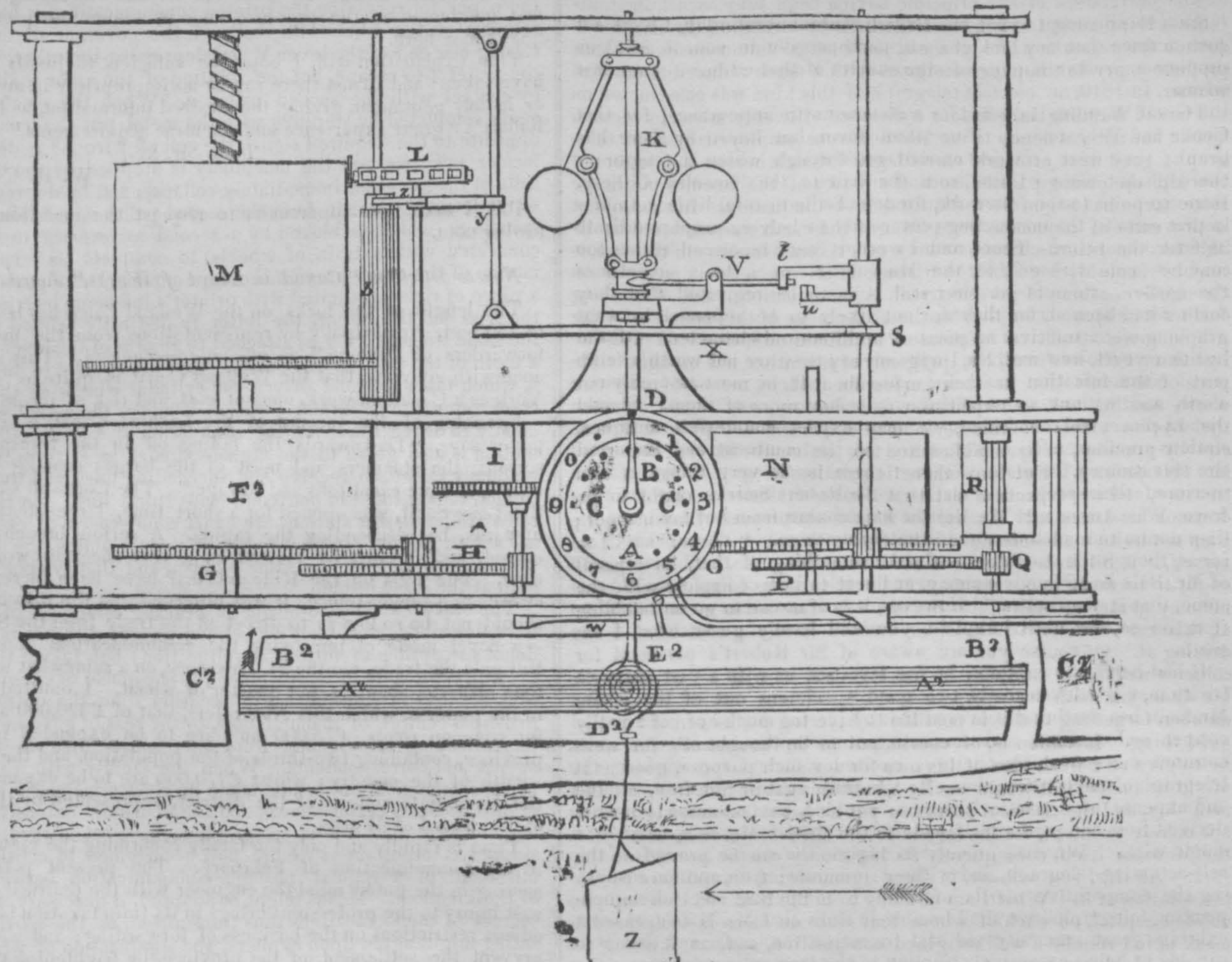
Dear Sir—At your request I have pleasure in stating, that I believe the Screw Pile is your own patented invention, and the plan of fixing lighthouses on submarine foundations (sandbanks) by their means, is also your's.

And I know that the plan, specification, and estimate of the Screw Pile Lighthouse, at the foot of Wyre, was, with the exception of the lantern, wholly prepared by yourself and son, which work you and your son erected by contract at your sole risk, after I had determined the site, and furthered the operation, by attending the tidal work in person until all the piles and pillars were planted. This statement is at your service. Remaining, your's truly,

Fleetwood, July 19, 1843. H. W. Denham.

Alex. Mitchell, Esq., Belfast.

ELECTRIC TELEGRAPHS.



THE application of the instantaneous transmission of electricity, as a means of communication between distant places, promises to become one of the most important inventions of the present age, and to rival even locomotion on railways in the facilities afforded of transmitting information. The science of electricity is yet but in its infancy; and though it has, during the comparatively short period of its study, withdrawn much of the veil from the works of Nature, that which has hitherto been revealed and already accomplished by its agency, serves to show that it is capable of disclosing far greater mysteries, and of being applied to much more important uses. When the transmission of electricity instantaneously through miles of wire became known, it was not long before the possibility of applying that property to the communication of signals suggested itself to the fertile ingenuity of man. The inconvenience of using frictional electricity, and the intervals of time requisite for its excitement, however, formed difficulties which could not be sufficiently overcome. Nothing, therefore, was effected in the construction of such telegraphs, though the high state of tension of frictional electricity renders it far better calculated for traversing long lengths of wire than the electricity of feeble tension excited by chemical action. The full tension of voltaic electricity, indeed, prevents it from overcoming the resistance which even the best conductors offer to its passage, and unless the quantity developed be great, and the conducting wire be perfectly insulated, much of the power will be lost in passing through a long circuit. It was not, consequently, until after the discovery by Professor Œrsted, in 1819, that the voltaic current would deflect a magnetic needle, and the subsequent discovery that the efficacy of a feeble current on the needle may be greatly increased by multiplying the convolutions of the wire through which it passes, that the efforts to construct an electrical telegraph assumed a practicable shape.

When it was ascertained that on causing a current of voltaic electricity to pass over a magnetic needle freely suspended, the needle was instantly deflected into a position across the direction of the current, it appeared reasonable to expect that, by employing several wires and magnetic needles, and by causing the electric current to deflect either of the needles at pleasure, their deflections might be so regulated as to form intelligible symbols. In the first stage of the invention, it was proposed to have as many magnetic needles as there are letters in the alphabet, each one having a separate wire passing over it connected with one of the poles of a voltaic battery. To each needle was affixed a small screen, which, when the electric current was not passing through the wire connected with it, concealed from view a letter or a figure. A number of keys were arranged somewhat in the manner of the keys of a pianoforte, each of which was connected with one of the wires of the voltaic battery, and a letter was marked on the key corresponding with the one concealed by the screen on the needle to which it appertained. By touching any one of these keys the metallic connection was completed, and the current of electricity, on passing over the magnetic needle, deflected it, and exposed to view the letter beneath. In this manner it is evident a correspondence could be carried on between persons far apart by either spelling the words, letter by letter, or by agreeing to certain symbols for the expression of words or sentences. As the transmission of electricity occupies no perceptible time, the deflection of the needle at the distant station would take effect almost at the instant the voltaic circuit was completed by touching the corresponding key. This application of electricity as a means of telegraphic communication, appeared to realise in principle the most sanguine expectations of its efficacy, but in practice many difficulties arose. The number of wires, and the perfect insulation each one required, would have prevented the plan from being practically applied, and the expense would have been a serious obstacle.

The correctness of the principle having been fully ascertained, attention was directed to render it available by arranging the needles in such manner that any two of them could act simultaneously, and thus produce a greater number of signals with a much reduced number of wires. In 1840, an electric telegraph of this kind was constructed on the Great Western Railway, for a distance of twenty miles, by Messrs. Cooke and Wheatstone. Five needles were employed on that telegraph; they were arranged on a diagonal dial, whereon the letters of the alphabet were painted, so that any two of the needles might be made to point to the letter required to be indicated. In subsequent improvements, the conducting power of the earth was rendered available for the return-current, and by other contrivances all the signals may be made with only three wires. This was a great advance on the earlier attempts at electrical communications, and if nothing further had been accomplished, the advantages of this system of telegraphing were sufficient to ensure its ultimate adoption. Within the last two years, however, the progress of invention has brought electrical communication to such perfection that, by means of one wire alone, and without an artificial voltaic battery, any signal between distant places can not only be indicated, but actually *printed* at both stations simultaneously. There are two claimants for the honour of the invention of the electro-magnetic printing telegraph, but into the merits of their respective claims we have no desire to enter. Professor Wheatstone and Mr. Bain, a watchmaker from Scotland, are the disputants, and each contends that the other has appropriated his ideas, though the mechanism of the two is not alike. The telegraph of Mr. Bain has this advantage over the telegraph of Professor Wheatstone, that it does not require the agency of any other electrical force than the natural electricity to be derived from the moisture of the earth.

It had been known for some years that a sensible degree of electricity may be developed by connecting different metallic veins, and Mr. Bain has further discovered that by placing plates of zinc and of copper underground, and connecting them by an insulated wire, a constant current of electricity is excited sufficient for working the telegraph of his construction. By this means the uncertainty, trouble, and expense of a voltaic battery is avoided, the actuating power is derived from the earth itself, and the telegraph may be worked by a single wire. We shall proceed to explain the *modus operandi* of this self-actuating telegraph, and without pronouncing an opinion respecting the comparative merits of the two competing electro-magnetic printing telegraphs, we shall be able to show that Mr. Bain's, at least, exhibits great ingenuity and vast inventive resources. and that it is capable of being extensively applied to the most important uses.

The annexed woodcut represents the apparatus in all its parts, an exact counterpart of which is to be placed at the distant station with which it is to communicate. F is a main-spring barrel acting on a train of wheels, G, H, I, which turn the balls of the governor K, and the hand B, of the dial A, B, C, whereon the requisite letters and figures are engraved. It will be observed, that the motion of the wheels is stopped by the arm E, which catches against the lever affixed to the arbor of the wheel I. To set the machinery in motion, therefore, it is necessary to remove the stop E from its bearing on the lever, and this is done by electrical agency in the following manner:— A^2 is a coil of wire twisted round a light hollow frame of wood, and freely suspended on a centre. B^2 is a powerful permanent magnet, fixed within the coil; and C^2 C^2 are sections of similar magnets. D^2 is a spiral spring connected with the source of electricity, buried underground, which leaves the coil free to move when the current of electricity passes through it, and brings it back to the original position when the electric circuit is broken. The peculiarity of this arrangement is, that the coil of wire is deflected instead of the magnet, by which deviation from the usual action, the deflecting force is rendered more energetic. The metal hand of the dial is connected with the deflecting coil, but it is insulated from the dial itself, the latter being in metallic connection with the wire laid down between the two stations, which serves to complete the electric circuit. When a metal pin is inserted into any one of the holes marked on the dial, the hand is stopped by pressing against it, and the metallic communication is then completed. The electricity thus passing through the coil of wire deflects it into the position represented in the woodcut—its natural position, towards which the spring D tends to carry it, being inclined upwards in the direction of the arrow. When the metal pin is removed, and the electric current is thus broken, the spring carries the end of the coil upwards, by which action the arm E relieves the lever, the train of wheels is set in motion, and they continue moving until the electric circuit is renewed by again inserting the metal pin into the dial. The type wheel L, on the arbor of the wheel H, is so adjusted, that when the hand of the dial is stopped at any letter, a similar letter is presented opposite to the small cylinder M, whereon the paper for receiving the printed communications is fixed. By the rotation of the wheels the balls of the governor diverge, thereby raising one end of the lever V and depressing the other, which allows the pallet *t* to escape, but the rotation of the arbor is still prevented by contact with the second pallet *u*. When the electric circuit is again completed by stopping with the metal pin the hand of the dial opposite to the required signal, the coil of wire A^2 is deflected to its former position, and the machinery is stopped by the arm E. The balls of the governor immediately collapse, and by depressing the end of the lever V, clear it from the second pallet *u*, and allow the crank spindle S (which is moved by a second mainspring in the barrel N, connected with a train of wheels) to complete its revolution. The motion of the crank presses the type against the signal-cylinder, and a piece of ribbon saturated with printer's ink being interposed between the type and the paper, the letter is distinctly printed thereon. At the same time a spring *z*, attached to an arm of the lever *y*, takes into a tooth of the small ratchet wheel *a*, on the spindle of the long pinion *b*, which takes into and drives the cylinder wheel, so that, when the crank returns to its former position, it moves the signal cylinder sufficiently to leave space for the impression of a fresh letter. A spiral motion is also given to the signal-cylinder as it turns, whereby it is gradually raised to receive the succeeding lines, and the message is, in fact, thus printed in one continuous spiral line. As the two apparatus at the distant stations are exact counterparts of each other, and are set in motion simultaneously by voltaic action, the hands on the dials always stop at the same symbol, and that symbol is printed on both at the same instant.

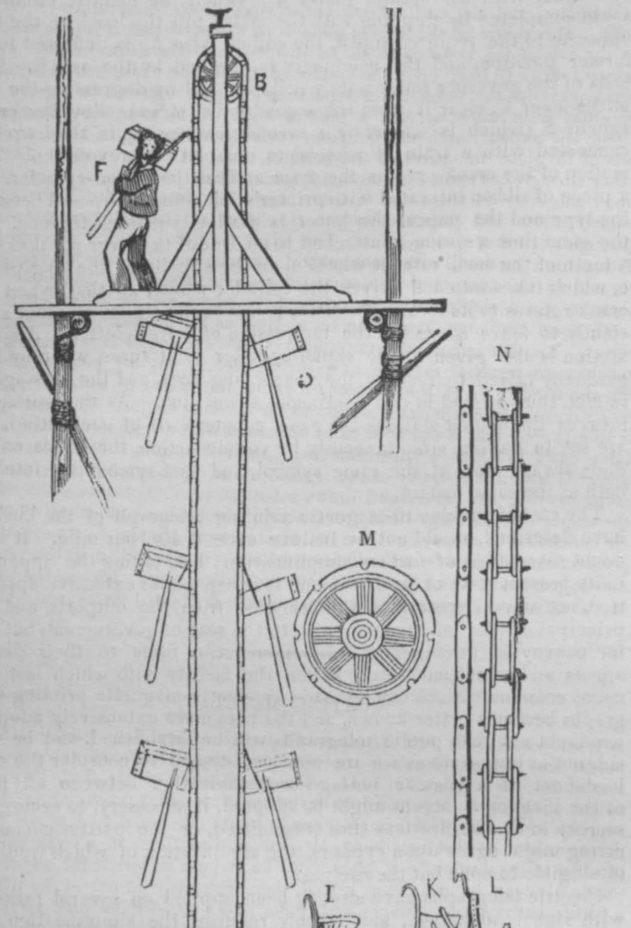
The cost of an electro-magnetic printing telegraph of the kind we have described, would not we believe exceed 40*l.* per mile. It is no doubt susceptible of further simplification; but, taking the apparatus in its present state of improvement, it is capable of extensive application, not only in transmitting information from the outports and the principal centres of manufactures, to the seat of government, but also for conveying intelligence from mercantile firms to their distant agents and correspondents. When the facility with which instantaneous communications can be made by electro-magnetic printing telegraphs becomes better known, and the plan more extensively adopted, we doubt not that public telegraphs will be established, and be considered as important as we are now accustomed to consider the establishment of a regular postage communication between all parts of the kingdom. Means might be adopted, if necessary, to secure the secrecy of communications thus transmitted, or the parties communicating might agree upon cyphers, the signification of which would be intelligible to none but themselves.

Electric telegraphs have already been applied on several railroads with signal advantage, and it only requires the simplification and cheapening of their construction, which seems to be now attained, to render their adoption on railways general. By communicating from station to station the time at which a train starts, its arrival may be anticipated with great exactness, and preparations made accordingly. This is essentially necessary in the case of special trains, and when the roads are undergoing repair, and, by thus forewarning the approach, might be the means of altogether preventing accidents from collisions.

Electric telegraphs also present an important economical advantage in the construction of railroads on lines of inferior traffic, since, by their aid, the transit of the trains to and fro might be conducted on a single line of rails with equal safety as on the most costly double line. As the departure of each train would be instantly signalled from one station to another, there would be no danger whatever, of two trains meeting; and the times of departure from each terminus could be so arranged that the up and the down train should meet at a stated point where a short double line might permit them to pass. We conceive it to be within the range of probable improvements in the electro-magnetic telegraph, that the wheel of the engine, as it passes along the rail, should be made to trace its course on the signal-cylinder of the printing telegraph, so that the position of any trains or number of trains on an extended railway might be known at a glance, and each one be seen tracing its own course on the telegraph chart of every station. But without waiting for further improvements, the electro-magnetic printing telegraph, in the state of perfection to which it has been brought by Mr. Bain and by Professor Wheatstone, affords facilities sufficient to render its adoption on all railways a point of duty with the directors, as such a forewarner of danger, it is admitted, would prove a most valuable preventive of accidents.

DOCTOR SPURGIN'S PATENT HOISTING MACHINE,

For Raising Bricks, Mortar, and any other materials employed in Building, and adapted to the Unloading of Ships and Warehousing of Goods.



IN our last month's *Journal* we stated that a new machine for hoisting bricks, &c., was to be seen at Prince Albert's Gate, Knightsbridge; we are now enabled to give our readers a rough sketch of the machine, together with a description which will explain its operation.

Description of the Machine.—The main part of the machine, A, consisting of the gearing to set the machine in motion, rests upon the ground. The second part is a trestle, which may be placed upon the scaffolding of the bricklayers, as at F; in the upper part of this trestle is an indented wheel, B, which corresponds perpendicularly with a similar wheel, attached to the principal body of the machine, resting on the ground. Passing round these two wheels is an endless iron chain, which is put in motion by one or several men, who turn the handle of the machine, A, consisting of a pinion-wheel working into a large toothed wheel, on the axis of which is an indented wheel, round which an endless chain passes, and also round a corresponding wheel at the side of the one at the foot of the vertical chain; the latter is set in motion when the wheel A revolves, together with the endless chain just described, over the indented wheels at C and E, by which the chain operates its rotation. On the side of the chain ascending, the workmen attach their hods full of materials, by means of a hook fixed in the hod, as at B, and others detach them, as at F, to carry them to the bricklayers on the scaffolding. The empty hods are attached to the chain on the opposite side, as at G, and descend to the ground, where they are detached, as at H.

The chain may be lengthened and shortened as necessary. When a story is added to the scaffolding, the trestle is placed upon the new story, and the chain lengthened as required. At the top is a screw for tightening or relaxing the chain, as occasion may require.

The figures I, K, L, are accessories used for hoisting the materials, viz. I, for broken bricks; K, for water; and L, for pieces of stone for windows, chimneys, &c. M is an enlarged view of the indented wheel, and N the chain.

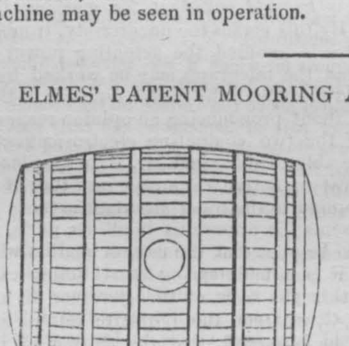
The advantages of this machine are, that it relieves the workman from the most toilsome part of his labour, by doing away with the practice of ascending the ladder; and it prevents, as far as possible, the accidents arising from this practice, to which he so often falls a victim. It also enables building operations to be carried on with much greater expedition than heretofore; and at the same time it diminishes the cost of such works.

DYNAMICAL TABLE *of the Strength of a Man, showing the number of Bricks that can be carried up a Ladder by an ordinary Labourer.*

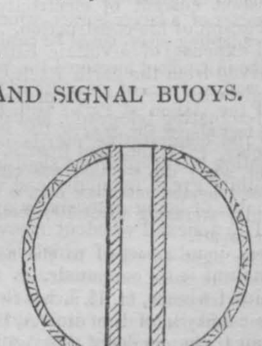
To 10 feet ..	90 bricks per minute,	5400 per hour,	54,000 in 10 hours.
20	45 "	2700 "	27,000 "
30	30 "	1800 "	18,000 "
40	22 "	1350 "	13,500 "
50	18 "	1080 "	10,800 "
60	15 "	900 "	9,000 "

Messrs. Grissell & Peto, and Mr. Cubitt, have adopted the machine, and have it in use at this time; the former at the New Houses of Parliament, the latter at Prince Albert's Gate, Hyde Park, where the machine may be seen in operation.

ELMES' PATENT MOORING AND SIGNAL BUOYS.



Plan of the top.



Section through the centre.

MR. ELMES, who is the Surveyor of the Port of London, observing the very great inconvenience and loss occasioned by the constant sinking of the mooring buoys on the river Thames, through perforations being made in them either by accident, or by the shrinkage of the materials, which cause them to be filled with water, turned his attention to see whether their construction could not be so formed as to render it next to impossible to sink them; the result has been the formation of the Patent Buoy, which we shall proceed to describe. In external appearance and materials, it is the same as those in general use, but through the centre there is a tube for the bridle-chain; and instead of it being attached to the underside of the buoy, it is in the patent buoy attached to the mooring ring at the top. The patentee states that the buoyancy is such that any number of holes perforated in its external surface will not injure it; and the interior of the buoy is divided into "vascular cells," which form water-tight compartments.

This invention is also applicable to all manner of floating bodies, as well as for ship's moorings, such as signal buoys, to indicate the situations of shoals, rocks, wrecks, and other dangerous impediments to navigation, for the carrying of floating beacons, flags, lights, bells, and other signals of contiguity to such danger. One of these buoys, a large beacon or signal buoy, has been floating securely for twelve months past, including the last tempestuous winter, in the bay of Dublin; and a mooring buoy of the largest size has been used, by permission of the Port of London Improvement Committee, in the corporation moorings, on the upper outside moorings off the East India Dock entrance at Blackwall, since the 18th of October, 1841, carrying in that deep and rapid reach of the river nearly two tons of mooring chains, and sustaining at its ring some of the largest ships that enter those docks during the whole of that severe winter till the autumn of last year. In spite of this severe work, and the fact that it has not had or required a sixpence outlay in repairs, it is as buoyant as ever.

NEW INVENTIONS AND IMPROVEMENTS.

REFLECTING LANTERN HELIOTROPE.

Description of a Reflecting Lantern and a Heliotrope, used by MAJOR J. D. GRAHAM, *as meridian marks for great distances, in* 1841, *while tracing, in his capacity of U. S. Commissioner, the due north line from the monument at the source of the river St. Croix.—(From the Proceedings of the American Philosophical Society.)*

The lantern was constructed by Messrs. Henry N. Hooper & Co., of Boston, under Major G.'s directions. It was similar in form to the Parabolic Reflector Lantern, sometimes used in lighthouses, but much smaller, so as to be portable.

The burner was of the argand character, with a cylindrical wick, whose transverse section was half an inch in diameter, supplied with oil in the ordinary manner. This was placed in the focus of a parabolic reflector, or paraboloid, of sheet copper, lined inside with silver about one-twentieth of an inch in thickness, polished very smooth, and bright. The dimensions were as follows:—

	Inches.
Diameter of the base of frustrum of reflector	16·
Distance of vertex from base	3·75
Distance of focus from vertex	2·25
Diameter of cylindrical burner	·50
Diameter of a larger burner, which was never used, but which, by an adapting piece, could be easily substituted	1·25

The instrument answered the purpose for which it was intended, admirably well, and was of great use in tracing the due north line. While it occupied the station at Park's Hill, 15 feet above the surface of the ground, or 828 feet above the sea, in the latter part of September, and early part of October, 1841, the light from it was distinctly seen with the naked eye at night, when the weather was clear, from Blue Hill, whose summit, where crossed by the meridian line, is 1071 feet above the sea; the intervening country averaging about 500 feet above the sea, and the stations being 36 miles apart.

The light appeared to the naked eye, at that distance, as bright, and of about the same magnitude, as the planet Venus. Viewed through the transit telescope, of 43 inches focal length, it presented a luminous disc, of about thirty seconds of arc in diameter. From its brilliancy at that distance, Major G. has no doubt that it would have been visible to the naked eye at 50 miles, and through the telescope at 100 miles, could stations, free from interposing objects, have been found so far apart.

It was remarked, that the wick employed by Major G. was considerably smaller than that usually made, even for parlour lamps; and to this cause he attributed, in a great measure, the perfection with which the parallel rays were transmitted from the reflecting parabolic surface, so as to make them visible at so great a distance. Though a greater quantity of light is generated by a larger wick, the portion of rays reflected in a direction parallel to the axis, and which alone come to the eye, is the smaller as the flame transcends the focal limit. The size of wick most advantageous for use, may easily be determined by experiment: Major G.'s impression is, that the smaller its transverse section, provided it is only large enough to escape being choked up by the charred particles, even one-third, or perhaps one-fourth, of an inch, the farther the light would be visible.

It has occurred to Major G. that lanterns of this description might be used with great advantage as station marks, in extensive trigonometrical surveys, requiring primary triangles of great length of sides. A revolving motion might be given to the lanterns, so as to make the light transmitted from them visible from many different stations within short intervals of time. Their simplicity, and the ease with which they are managed, would perhaps give them, for such purposes, a great advantage over the Drummond or Bude lights, even though they be not so brilliant as the latter.

The heliotrope, which he employed in the day time, was made by order of Mr. Hassler, at the instrument shop of the coast survey office. It was a rectangular parallellogram of good German plate glass, $1\frac{4}{5}$ by $1\frac{1}{5}$ inch in size, giving an area of reflecting surface of $2\frac{16}{100}$ square in. This also was seen at the distance of 36 miles.

SELF-ACTING CIRCULAR DIVIDING ENGINE.

At one of the recent meetings of the Astronomical Society, a paper by W. SIMMS, Esq., was read describing a *Self-acting Circular Dividing Engine.* The engine, in general arrangement and construction, is similar to that made by Mr. E. Troughton, though there are several additions and peculiarities, which are pointed out. The circle or engine-plate is of gun-metal, 46 inches in diameter, and was cast in one entire piece, teeth being ratched upon its edge. The centre of the engine-plate is so arranged that it can be entered by the axis of the instrument to be divided, and the work by this means brought down to bear upon the surface of the engine-plate, which arrangement prevents the necessity of separating the part intended to receive the divisions from its axis, &c., a process both troublesome and dangerous. Upon the surface, and not far from the edge of the engine plate, are two sets of divisions to spaces of five minutes, one set being in silver and the other strongly cut upon the gun-metal face. There are also as many teeth upon the edge as there are divisions upon the face of the engine-plate, namely, 4320, and consequently one revolution of the endless screw moves through a space of five minutes. The silver ring was divided according to Troughton's method, with some slight variations. In this operation it seemed to the authors the safer course to divide the circle completely, and then to use a single cutter for ratching the edge; and he believes that the teeth upon the edge have been cut as truly as the original divisions themselves. Another important arrangement is, that the engine is self-acting and requires no personal exertion or superintendence, nothing being necessary but the winding up of the machine, or rather the raising of a weight which, by its descent, communicates motion to the dividing engine. The machinery is so arranged that it can be used or dispensed with at pleasure, there being some cases in which a superintending hand is desirable. The author then proceeds with a description of the machinery, as represented in the drawings accompanying his paper, and draws attention to the contrivance by which the engine can discharge itself from action when it has completed its work. He concluded by observing that the machinery is simple, by no means expensive, can be made by an ordinary workman, is adapted to all the engines now in existence, which are moved by an endless screw, lessens the labour of the artist and increases the accuracy of the graduated instrument.

COATING METAL.

WILLIAM HENRY FOX TALBOT, of Laycock Abbey, Esq., has obtained a patent for "*improvements in coating or covering metals with other metals.*" Patent dated November 25, 1842. The specification of Mr. Talbot's present patent discloses no new principle in the art of metallic precipitation; but it supplies some very useful improvements in its manipulative details.—1. To prepare metal articles for gilding, Mr. Talbot dips them in a weak solution of silver in hypo-sulphate of soda. 2. To prepare an article for either gilding or silvering, he first cleans it well, then connects it to one of the wires of a voltaic battery, next plunges both poles into a vessel filled with some acid solution, which, decomposing the water, the hydrogen is given off by the article intended to be gilt or silvered. After a little time the article is detached from the battery, and thrown into a solution of gold or silver, where it speedily acquires the required coating. 3. To gild metallic articles, he makes use of a mixed solution of gold, and any one of the baser metals, with the exception of mercury, which would separate the gold. 4. He also uses for gilding a solution of chloride of gold, mixed with a solution of boracic acid, the latter having the effect of greatly improving the colour. 5. To remove the dark tint which metallic articles sometimes acquire when dipped in a solution of gold, they are immersed in a very weak solution of nitrate of mercury. Any mercury which may adhere is afterwards removed by an acid, assisted by voltaic action. And, 6. When in silvering an article, the solution of silver ceases to impart any addition to the coating (in consequence of the coating and the solution becoming of identical properties), Mr. Talbot dips it into a different solution of silver, or into a solution of some other metal, after which he replaces it in the first solution, when it is found to act with the same energy as at first. The same method of alternate dipping is also applicable to solutions of gold.—*Mechanic's Magazine.*

OXIDES OF METAL.

JOHN MULLINS, of Battersea, Surrey, surgeon, has obtained a patent for "*certain improvements in making oxides of metals, in separating silver and other metals from their compounds with other metals, and in making white lead, sugar of lead, and other salts of lead, and salts of other metals.*"—Patent dated October 27, 1842.—Mr. Mullins's improvements are six in number. First, he produces oxides of lead and other metals by forcing currents of atmospheric air, or oxygen gas, through masses of the metal in a melted state, "heated to the temperature of their respective points of oxidation," and then skimming off the oxides from the surface. Second, to make white lead he exposes the oxide of lead obtained by the preceding process, which is stated to be much superior to the ordinary litharge and vitrified massicot of commerce, to the vapours of vinegar and carbonic acid gas. Or, third, he exposes a solution of acetate of lead, or other suitable salt of lead, made from "the oxide obtained as aforesaid," to an atmosphere of carbonic acid gas. We quote at length the patentee's description of the mode in which this is effected; it is new, ingenious, and likely to answer well. "In chambers, or large jars of earthenware, or other material, are suspended several large sponges, which are supported in the jars by strings of worsted, so as not to touch the sides of the jar, or one another. Having made a saturated, filtered, and neutral solution of acetate of lead, or of other suitable salt of lead, from the oxide obtained as aforesaid, and placed this solution in a vessel above the top of the jars, and having moistened slightly the sponges with the solution, and also the worsted strings suspending them, the strings are then made to dip into the solution contained in the vessel above the jars, and, by the power of capillary attraction, the sponges are kept constantly moist by a supply of the solution descending down the worsted strings; and the supply can be regulated at pleasure by the size of the strings, or otherwise. Evaporation is continually going on, and crops of salts of lead are formed on the surface of the sponges. The jars are made to communicate with a gas-holder, or other reservoir, containing carbonic acid gas, which gas is made to fill the jars in order that the sponges may be surrounded with an atmosphere of carbonic acid gas. By the action of the gas, the salt of lead on the sponges is readily converted into ceruse, assisted probably by the decomposition of the acid of the original solution. When it has been ascertained that a sufficient quantity of the ceruse has been formed, the sponges are removed and washed in a vessel of pure water; and if the sponges contain any undecomposed soluble salt of lead, which is generally the case, the water dissolves it, but the ceruse falls to the bottom on the water remaining at rest. The water is to be re-used for forming the solution when decanted from the precipitated ceruse. The sponges are then replaced as before and the process continues." Fourth, he employs common soot to deoxidize his oxide of lead, and generally for the reduction of all metals from their ores or oxide. Fifth, when a mass of melted lead, treated by the process just described, contains any silver, the silver, being less oxidizable than the lead, accumulates at the bottom of the pot, whence it is drawn off occasionally to be farther purified and separated. And sixth, to separate iron, the oxides are discharged down a shoot, fixed at an angle of about thirty degrees, formed of wood, or of some other non-conducting material, from the bottom of which the poles of a number of magnets project upwards, and to which a slow, lateral, sieve-like motion is given by machinery; the magnets attract and retain the iron, and the oxides pass free.—*Ibid.*

IMPROVEMENTS IN IRON.

JAMES PALMER BUDD, of the Ystalyfera Iron Works, Swansea, for "*improvements in the manufacture of iron.*"—Patent dated October 20, 1842; Mr. Budd's improved process of manufacturing iron, as contradistinguished from Neilson's and Crane's processes, may be called the *cold anthracite blast.* The points of novelty to which he lays claim are these—First, the application of anthracite or stone coal, combined with a blast of atmospheric air, in the natural or unheated state, maintained at a pressure or *pillar* of upwards of 2½ lbs. on the square inch, in the smelting or manufacturing of iron from ironstone, mine, or ore. Secondly, the application of anthracite or stone coal, combined with the use of water tuyeres, and with a blast of atmospheric air in the natural or unheated state, in the smelting or manufacturing of iron from ironstone, mine, or ore. Thirdly, the application of anthracite or stone coal, in combination with four or more tuyeres, and a blast of atmospheric air in the natural or unheated state.—*Ibid.*

GAS.

JAMES CRUTCHETT, of William Street, Regent's Park, engineer, has obtained a patent for "*certain improvements in manufacturing gas, and an apparatus for consuming gas.*"—Patent dated July 12, 1842.—The "improvements in manufacturing gas" consist in producing, by a peculiar apparatus, described by the patentee, a triple compound, composed, first, of coal or other gas; secondly, atmospheric air, (in the proportion of from 5 to 15 per cent); and, thirdly, vapour of naphtha, or other volatile hydro-carbon, (in what proportions is not stated). The most remarkable feature in the apparatus employed for this purpose is, that the moving power which actuates it is the gas itself. The improvements in "apparatus for consuming gas" consist in substituting for the ordinary concentric rings a spiral coil, "by which the light is equally concentrated, with the advantage that only one inlet-pipe is required."—*Mechanic's Mag.*

METAL SHIPS.

WILLIAM FAIRBAIRN, of Manchester, engineer, has obtained a patent for "*certain improvements in the construction of metal ships, boats, and other vessels, an the aration of metal plates to be used therein.*"—Patent dated July 6, 1842.—The plates are so rolled or constructed as to be perfectly smooth on that side which is to become the outer side of the vessel, but along the two inside edges of the plate there are raised two bands or strips, varying in breadth, according to the thickness of the plate, and, of course, the strength of rivet to be used in joining them. The plates are to be punched in the usual way, and afterwards counter-sunk on the outside. In joining, the plates are brought edge to edge, being flush on the outside; and upon the inside is laid a piece of flat bar iron, pierced with two lines of rivet holes, so as to correspond with the holes in the plate, to which it is to be riveted. Where it is required to have greater strength, so as to resist increased external pressure, the flat bar has a raised feather along its outer side, the section of which will form that of a T. The bands, or strips, along the edges of the plate are to be of such thickness as to make the plate of uniform strength throughout when pierced for the rivets; and thus to obviate the risk of the plates being broken in that part, which is generally, if not always, found to be the result in cases of concussion, &c. The rivets are so made as to fill the countersink, and thus present a uniform smooth surface on the outside of the vessel when completed, which of course must meet much less resistance in passing through the water.—The claim is to the manufacturing of plates, and joining them as above-mentioned, in the construction of boats and other vessels.—*Mechanic's Mag.*

A FIRE-PROOF POWDER MAGAZINE.

An experiment was lately made at Paine's wharf, Westminster, for the purpose of testing the capabilities of a magazine to contain powder in ships of war, recently patented by Mr. J. A. Holdsworth, as being impervious to fire, though subjected on all sides to the greatest possible degree of heat. A model of a magazine, about nine feet square, was placed on the wharf within a few feet of the water's edge. This model is formed of a double set of thin iron plates, riveted together at about two inches and a half asunder, the hollow being filled with water, and supplied from a vat placed somewhat above the level of the magazine, and entering it through a pipe inserted in the lower part of the model. A channel of communication exists through every side as well as the top and bottom, and from the upper surface a second pipe conveys the stream of water back to the vat from which it is supplied. The door of the magazine is hung on hinges, made hollow, and guarded from leaking by stuffing boxes, so that the water flows into the door through one hinge and out through the other. The patentee having explained the principle of his invention, placed a quantity of combustible matter within the model, over which some gunpowder was laid on a sheet of paper. A registering thermometer having been placed inside, the door was closed, and a stack of dried timber deposited on every side of the model, was set a-light. The fire was kept up more than half an-hour, and the water rose to very nearly boiling heat, continually passing in a stream through the upper pipe into the reservoir containing cold water. On the door being opened, the combustible matters and powder were found to be perfectly uninjured, and the highest point to which the mercury had risen within the model was marked at 100 degrees of Fahrenheit. A somewhat similar principle has been applied to the stoker's room in the *Victoria and Albert* royal steam yacht, where the bulkheads have been constructed of two plates of sheet iron, instead of wood faced with iron, a stream of water constantly flowing between, by which means the temperature of the engine room is kept cool.

ORNAMENTAL GLASS.

MR. JOHN CARR, of North Shields, earthenware manufacturer, and AARON RYLES, of the same place, agent, have obtained a patent for "*an improved mode of operating in certain processes for ornamenting glass.*"—Patent dated 9th November, 1841; which consists of improvements in the operations of staining, stopping out, and obscuring glass. In the improved method of staining glass, the staining materials, instead of being mixed with oil of turpentine, or other volatile oils, or water, as usual, are mixed with boiled linseed oil, or such other oil as is generally employed when printing with enamel colours on glass; and instead of floating the staining materials over the glass, in a liquid state, they are printed or transferred from metal plates, and, when dry, are fixed by firing, in the usual way. When operating with staining materials mixed with oil, as aforesaid, on pot metal, or on flashed glass, opaque and transparent shades are produced, leaving the surface of the glass quite smooth, instead of being raised in those parts, as in the common mode of applying body colour, for the purpose of shading. As regards the operation of stopping out, the materials, used for that purpose, are mixed with boiled oil, and printed on the glass, in the manner above described: the liquid staining composition is then floated over the whole surface, including the parts so stopped out, and the colour is fixed by firing. After the glass has been cleaned, the pattern, which was printed on it in stopping out materials, is exhibited in the original colour of the glass, and quite distinct from the stained ground; or a printed impression being transferred to the glass, in stopping out materials, as aforesaid, the remainder of the ground may be obscured in the usual manner; thus producing transparent patterns on obscured grounds. The improvement in the process of obscuring glass, consists in mixing the materials, which are used to produce this effect, with boiled oil, and transferring impressions from engraved metal plates on to the glass; thus producing obscured patterns on transparent grounds.—*London Journal.*

PREPARING PAINTED SURFACES OF PAPER.

Henry Martin, of Norton-terrace, Camden-town, painter, has obtained a patent for "*improvements in preparing surfaces of paper.*"—Patent dated March 30, 1840. This invention consists in embossing and enamelling the surfaces of paper, and in manufacturing paper-hangings. A coat of oil-paint, of the desired colour, is first applied to the surface of the paper, as evenly as possible, with a common paint-brush; it is then rubbed lightly over with a brush, similar to a clothes or shoe-brush (giving it a circular motion), to remove the marks of the paint-brush; after which, an additional smoothness is given to the painted surface, by passing a dry brush, called a "softener," lightly over it. If more than one coat of paint be laid on, this process is repeated. Or, instead of the above method, the paint may be applied by conducting the paper between two rollers, together with an endless felt or other fabric, which is supplied with paint by passing under a roller partly immersed in it, the superfluous paint being removed from the felt, as it ascends, by a scraper. The paper, thus prepared, is embossed, by passing it between engraved rollers or dies; or is converted into paper-hangings, by printing the required designs upon it with blocks or other surfaces. If a glazed or enamelled surface is to be given to the paper, the oil-paint must be used in a thick or round state, and thinned only with turpentine, in the same manner as if it were used for "flatting." When the turpentine evaporates, the colour becomes set; the paper is then placed upon a bed of woollen cloth or other soft material, and a pallet-knife or trowel, with a polished surface, is passed over the painted surface of the paper, with a slight pressure; the colour being set, yields to the pressure, and a glaze is thereby produced, which may be afterwards heightened in the usual manner. Other means may be resorted to for glazing the painted surface of the paper, if preferred.—*London Journal,*

NEW SAFETY VALVE FOR ENGINE BOILERS.

(From the Transactions of the Liverpool Polytechnic Society.)

The Secretary read an interesting letter on this subject from Mr. Maitland, formerly a member of the society. It was dated Montreal, where the writer was then residing. The following are extracts:—

"Shortly after my arrival in this country, a serious explosion took place of a steam-boiler on a canal high-pressure boat. The boiler was constructed on the locomotive principle. The effect of the explosion took place immediately behind the tube-plate of the fire-box. The boiler had no appearance that indicated that the explosion had taken place from scarcity of water. The engineer, in evidence, declared that he was allowed to carry 85 lb., but there is no doubt but that a much greater pressure than that would be required to tear the boiler in the manner the Shamrock's was torn. The boiler was constructed throughout of ¼-inch plate. This, there is no question, is too thin for tube plates. The tubes were wrought iron. From all the circumstances of the case, I have no doubt but the boiler exploded from a too great accumulation of steam, and having either a too small or inefficient safety-valve, they did not allow it to blow off. From this circumstance I was induced to pay some attention to, and, if possible, to improve, *the safety valve.* I send you a sketch of one which I consider does away with many of the objections of the present one in use. It is more especially useful when steam of high pressure is used. If a valve is constructed to be out of the reach of the engineer—that is, to be loaded in the box that contains the valve, if the valve be of any size at all—the weight requires to be enormous, for the pressure is 15, 20, or 30 lb. per inch. In the valve I have invented this objection does not hold, as the same amount of weight will load a 10-inch valve at the same pressure, as it would load on the old plan a valve of 2 in. diameter. The top valve is 10 in. diameter, and the lower one 9⅞ inch; consequently, the area to be loaded is only a ring 10 inches diameter and one-eighth inch broad. As the Polytechnic Society is established for the advancement of science, I will, if it would be of any service to its members, prepare a paper on marine engineering in this country. The boats attain a speed here, with an economy of fuel as you have as yet not got at home. A boat was started this summer on the St. Lawrence, called the Montreal; she is the fastest in North America. Some engineers visited her here from the Hudson, and they declared they had nothing that surpassed her. She is 250 feet long; breadth, or beam, 27 feet; depth of hold, 10 feet; diameter of cylinder, 57 inches; length of stroke, 10 feet; diameter of wheel, 30 feet; length of float, 10 feet; and depth of float, 2 feet 6 inches; strokes, 21 per minute; steam, 25 lb.; speed, 15 miles per hour!"

Mr. Maitland's valve consists of a very simple and ingenious modification of the common equilibrium valve, now well-known and much used among engineers. Steam from the boiler enters freely a flat chamber, the top and bottom of which are formed by two valves, firmly connected together and both opening upwards. Now if these two valves be of equal diameter, the steam-pressure above the lower valve will exactly counterpoise the pressure beneath the upper valve, consequently the valves will have no tendency to rise, and no steam will be allowed to escape. But if we suppose the upper valve to be even one-eighth of an inch the larger in diameter, the pressure on it will overcome that on the lower valve, and the two valves being connected together they will both rise, and allow the steam rapidly to escape (upward through the upper valve, and downward through the lower one); and it is evident that the weight necessary to load this valve is exceedingly small, viz., just sufficient to balance the pressure on an area equal to the difference between the areas of the two valves, whilst the valve is as efficient as a common safety-valve having an area equal to the sums of the areas of the two valves. The force necessary to keep this valve down is so small that the ordinary lever is dispensed with; and in place of it a weight corresponding to the pressure required is placed immediately upon the top valve, thus preventing a tendency to gag or stick from want of attention, and making the apparatus what it really is—pre-eminently a *safety-valve.*

THE SMOKE NUISANCE.

REPORT OF THE PARLIAMENTARY COMMITTEE.

The select committee appointed to inquire into the means and the expediency of preventing the nuisance of smoke arising from fires or furnaces, and who were empowered to report their opinion, together with the minutes of evidence taken before them, to the House, have considered the matters to them referred, and have agreed to the following report:—

In their endeavours to investigate the subject, your committee have deemed it expedient to call before them a variety of persons. They have received the evidence of the most eminent men in the science of chemistry, of practical engineers of high reputation, of leading master manufacturers and proprietors of steam-engines, and of ingenious persons who had devised means and taken out patents for the prevention of smoke. The attention of the parties called to give evidence has been principally directed to the consideration of the following heads, on which their opinions were given.

1. Whether it was practicable entirely to prevent, or very much to diminish, the nuisance now so severely felt in large towns and populous districts from the smoke of furnaces or of steam-engines.

2. Whether, if this were practicable, it would be advisable to take any steps to prevent the nuisance; as so doing might interfere with the property or interests of manufacturers, or of the proprietors of furnaces.

3. If, in the event of the two former questions being answered in the affirmative, they would recommend some legislative enactment to be framed to prohibit the nuisance of smoke.

In regard to the first of these questions, it appears from the whole of the evidence of scientific and practical men, including master manufacturers, that smoke, which is the result of imperfect combustion, may in all cases be much diminished, if not entirely prevented.

It appears to be the unanimous opinion of the witnesses conversant with the subject, that imperfect combustion arises from a deficiency of atmospheric air to mix with and act on the inflammable matter at a proper temperature, and under circumstances which must ensure its effective operation; that this admission of air, properly regulated, is the great, if not the only, principle of preventing smoke which is generally applicable; and that all inventions for the prevention of smoke (except where the smoke has been separated mechanically by an artificial shower of water, produced in a flue constructed for the purpose,) are only various applications, in different forms, of this general principle: even the flow or jet of steam which has been applied by some persons to prevent smoke in furnaces, being merely a modification of this general principle; as, though steam may modify combustion, air must necessarily flow in with it, otherwise the combustion in the furnace is arrested.

The evidence before your committee further shows, that the admission of atmospheric air, under proper regulations, into the furnace, is productive of saving in fuel, by causing the particles of carbon, which would otherwise rise in smoke and be wasted, to ignite, and thereby to increase the heat in the boiler.

It appears that the expense attendant on putting up whatever apparatus may be required to prevent smoke arising from furnaces is very trifling; and, as some of the witnesses observed, the outlay may be repaid within the year by the diminished consumption of fuel. For additional information on this subject your committee beg to refer to the evidence.

Several most ingenious patents and inventions for the prevention and consumption of smoke, were laid before your committee, which, from the testimony of the proprietors of furnaces by whom they were adopted, appeared to answer the twofold purpose of preventing smoke and of lessening the quantity of fuel required.

The means of preventing smoke might also be applied to the furnaces of steam boats; but such application would be attended with rather more expense than on land, from the occasional want of space, and the setting of boilers, in a steam-vessel. No doubt, however, existed, in the opinions of those examined, that the prevention of smoke could be accomplished in all steam-vessels.

The use of anthracite coal and of coke, as the means of preventing smoke, were not overlooked by your committee; but, being well known, need not be repeated here.

In reference to the last and most important point under the consideration of your committee, how far it would be expedient to frame some legislative enactment to lessen the nuisance from smoke, your committee, after a careful survey of the evidence before them, seeing that the evils arising from smoke are severely felt in all populous places, and are likely to increase in proportion as wealth and the use of machinery cause a greater extension of furnaces and steam-engines, come, without hesitation, to the conclusion, that such a legislative enactment should be introduced without delay; and they trust that the perusal of this evidence will ensure cordial aid and co-operation, on the part of the proprietors of factories, in accomplishing an object so essential to the comfort and well-being of the surrounding country and population; an expectation which your committee feel justified in entertaining, by the knowledge of the laudable exertions which have lately been made, with much success, by the manufacturers and inhabitants of Leeds and Bradford, in Yorkshire, for the prevention of smoke in those districts.

Your committee have received the most gratifying assurances of the confident hope entertained by several of the highest scientific authorities examined by them, that the same black smoke proceeding from fires in private dwellings, and all other places, may eventually be entirely prevented, either by the adoption of stoves and grates formed for a perfect combustion of the common bituminous coal, or by the use of coke or of anthracite; but they are of opinion, that the present state of knowledge on that subject is not such as to justify any legislative interference with these smaller fires.

In conclusion, therefore, your committee beg leave to recommend that a bill should be brought into parliament at an early period of the next session, to prohibit the production of smoke from furnaces and steam-engines.

They indulge a hope that the matter will be thought of sufficient national importance to induce the government to bring in a bill: but, in the event of their not doing so early next session, your committee recommend that the chairman of this committee should frame such a measure, as being the necessary result of the complete and strong conviction to which they have come by the prosecution of the inquiry.

17th August, 1843.

KYANIZING OF TIMBER.

SIR,—A letter having appeared in your Journal for August, from Mr. Taswell Thompson, Secretary to the Anti-Dry-rot (Kyan's) Company, commenting on my report and letter on the preservation of timber from decay, I trust you will allow me a corner in your valuable Journal in answer thereto.

Mr. Thompson says that I have made statements most injurious to the interests of the Kyanizing Company.

As *secretary* to that company, he is no doubt most anxious about its interests; but I have *no interest whatsoever in any process or patent*, and have only been anxious to find out the best mode of preserving timber from decay, and the attacks of worm.

Mr. Thompson states that both my report and letter are very inaccurate. Now, Sir, this charge of "inaccuracy" refers chiefly to my statements respecting the decay of sleepers at the West India Dock warehouses, and the wooden tanks in the Kyan Company's yard.

To justify the truth of my statements, I think you will agree with me, that it is only necessary to refer to the published minutes of the discussion t the Institution of Civil Engineers for session, 1842, in which the follow- g appears:—

"Mr. Samuel Seaward said he believed the present method of Kyanizing to be very imperfect, and alluded to a number of sleepers so prepared for the West India Dock warehouses having recently been discovered to decay.

"Mr. Martin (Engineer to the East and West India Docks) confirmed this account of the decay of sleepers. *Fifty out of seventy were destroyed.* They had been prepared by simple immersion, and had been down about five years. He had understood that some of the wooden tanks in which the solution was kept at the Anti-Dry-rot Company's yard were decayed.

"Mr. Bull had prepared considerable quantities of boards for the Calder and Hebble navigation, by immersing them in the solution for two or three days, which was about double the period allowed by the patentee. He had some specimens of boards, and in almost all of them there was an appearance of decay in various stages. An oak board one inch thick, Kyanized in 1839, had lain ever since upon the damp ground, exposed to the air; the sap part was entirely decayed, but the heart remained sound; fungus was, however, growing upon it. Poplar boards, Kyanized in 1838, 39, and 40, were all partially decayed. In preparing the timbers, he had always followed the instructions of the patentee, and had tested the strength of the solution with the hydrometer, but had mixed up fresh solution even more frequently than was supposed to be required. On dismantling one of the tanks for holding the solution, he found the iron work partially destroyed, and entirely covered with globules of mercury."

It appears that Mr. Thompson did himself take part in this discussion. Why did he not then contradict the statements, if untrue? or after these minutes had been printed and published in almost every journal in London, why did he not explain them away at the time, instead of reserving his explanations and answer for many months? And even to this moment, in the absence of such explanation, I was, and am now, of course, bound to believe the statements of Mr. Seaward, Mr. Martin, &c. But you will observe, Sir, that he does not, even now, deny the fact of the sleepers and tank having decayed; he only says the sleepers were not in the West India Dock warehouses, but were laid down in Kyan's own yard. In my opinion, this explanation makes the matter worse, because, if the Kyan company's process will not preserve the timber laid down in their own yard, how can they expect that the public will believe that it will preserve timber elsewhere.

Mr. Thompson must be well aware that I could have cited many other instances of its failure; what says that eminent civil engineer, Robert Stephenson, Esq., in his report respecting the sleepers of the London and Birmingham Railway? "They were all Kyanized, but the result has been unfavourable and unsatisfactory, for after laying three years, great numbers discovered symptoms of decay, indeed many have been removed absolutely rotten, and he had abandoned the Kyan's process, and adopted Mr. Bethell's oil of tar.

Why has I. K. Brunel, Esq., C.E. (under whose directions such immense quantities of timber were Kyanized) abandoned it and adopted the oil of tar? Will Mr. Thompson inform us what has become of his Kyanizing tanks at Bristol, and how many loads of timber were Kyanized at Hastings during the last two years; and also at Shoreham? and why were the tanks at the latter place offered at 10*s.* per load to be converted into oil of tar tanks.

What says Mr. Thompson to the experiments in the mushroom-house at Welbeck, where good Baltic timber lasted longer than the best Kyanized oak? and will he tell me how many hundreds of Kyanized sleepers on the London and Brighton Railway have decayed?

On the 31st of last month I visited the model-rooms (or museum) of the Admiralty at Somerset House, and examined pieces of Kyanized oak and fir now there, which were placed in the sea at Sheerness, and are perfectly honey-combed and destroyed by the worm.

Dr. Moore proved the same thing at Plymouth: and amongst the *Transactions of Civil Engineers*, is a report from a gentleman at Dover, proving that Kyanized timber shared the same fate there, and that the worms eat it quite as much as they did the unprepared timber. I could bring a host of other proofs if requisite. But I think I have said enough to dispose of Mr. Secretary's first and second heads.

As to the third head—that of the Kyanized timber at Shoreham Harbour —I here most respectfully beg to deny, most positively, that there was a Report and Survey by the Commissioners of Shoreham Harbour; and I say positively, that every piece of Kyanized timber in the piers at Shoreham Harbour—that is, placed at any time during the last five years under high water mark, and exposed to the action of tidal water—is gone through several stages of decay, and affected by the worm; and that the oak timber Kyanized is in a worse condition than the unprepared timber.

I have, in my possession, certificates from eminent professors, civil engineers, &c., and from the largest timber merchant and also builder in the port of Shoreham; also from all the carpenters, &c., workmen of Shoreham Harbour, substantiating the above, which I am ready to publish at any time.

As to Mr. Thompson's fourth head, if he had read my letter on Kyanizing carefully, he would have seen that I grounded my opinion as to the injurious effect of the vapour of mercury, on the opinions given to the Admiralty by Sir Humphrey Davy.

In conclusion, allow me to state that my opposition to corrosive sublimate arises alone, which I have publicly announced) from a conviction that in hydraulic works (and it was such works that my letter and report treated upon) it is as useless as soft soap, as it does not prevent decay when exposed to sea water, as hydraulic works generally are.

The importance of the subject of preserving timber, I hope will be a sufficient excuse for the space I have occupied in your *Journal.*

I am, Sir,
Your obedient servant,
WILLIAM B. PRICHARD.

HEALTH OF LIVERPOOL.—On the occasion of Dr. Lyon Playfair proceeding to Liverpool to examine into the causes of the great unhealthiness of that northern metropolis, Mr. Henry Laxton, has addressed to him a short pamphlet, in which he ably lays bare the prominent causes of the evil, and suggests the requisite improvements. He attributes the unfavourable state of Liverpool, as regards health, principally to the following causes: open cesspools; proximity of buildings; inefficient drainage; smoke from factories and steam vessels; cellar occupation, and dirty state of buildings; open spaces, where water and refuse are allowed to collect and decompose; inefficient supply of water, and deficiency of pleasure grounds for the school children.

THE RELATIVE EFFICIENCY OF LONG AND SHORT CONNECTING RODS, CONSIDERED IN THE EXPOSITION OF CRANK AND CONNECTING ROD MOTION.

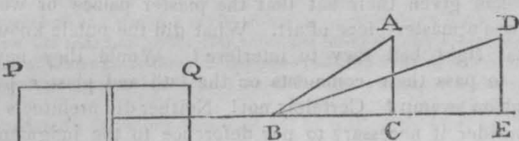
By H. F. Clifford.

The subject of the following paper is one of great importance to the practical mechanic; and as we have never yet seen any satisfactory solution of this long disputed question, we have endeavoured to draw such conclusions from the investigation of the theory of crank and connecting rod motion as we feel convinced will set at rest all previous doubts concerning the comparative advantages of long and short connecting rods. With a given force in the direction of the piston, our object in the present investigation is to ascertain the best means of obtaining the greatest amount of that force in the direction of rotation, and thus render friction as small as possible; in other words, whether is a short or long connecting rod the more effectual method for fulfilling the conditions of our proposed inquiry?

We shall first show that if F be the original force exerted by the piston rod of a steam engine along its own axis, that there is more of that force transmitted in *the direction* of the long rod than the short one.

Let P Q, Fig. 1, be a cylinder with piston, and let the piston rod exert a force F, at the point B, where the rods B A, B D, connect it respectively to the cranks A C, D E.

Fig. 1.



Let A B make an angle (φ) with the horizon.
B D .. (θ) ..

The resolved part of F $\begin{cases} \text{in the direction of A B} = F \cos \varphi. \\ \quad .. \quad \text{B D} = F \cos \theta. \end{cases}$

Now the magnitude of the force in either direction depends on the cosines of the angles, which the respective rods A B, B D, make with the horizon, and since $\cos \phi$ and $\cos \theta$ become a maximum when ϕ and $\theta = o$, it follows the smaller the angle the larger the numerical value of the cosine, and since θ is considerably less than ϕ, the long rod has evidently more of the resolved part of F in its direction than the short one.

Again—

The resolved part of F $\begin{cases} \text{in the direction of A C} = F \sin \phi. \\ \quad .. \quad \text{D E} = F \sin \theta. \end{cases}$

The magnitude of the forces in this case depends upon the sines of the angles, and since the larger the angle the greater the sine, the resolved part of F in A C, is much greater than that in D E; in other words, the pressure into the centre, or friction in the axle, is more in the short than in the long rod.

Having proved then that there is more force in the *direction* of the long rod, we now proceed to show that *the resolved part of the force in* B A, and B D, *in the* DIRECTION OF ROTATION, is greater in the case of the long than the short rod; or,

Proposition. To find the part of the force exerted by the piston rod of a steam engine which is perpendicular to the crank, in any given position of the fly.

Let E A, Fig. 2, be the piston rod, the direction of which produced is supposed to pass through the centre of the fly C; A B, the connecting rod; C B, the crank: B T D, the tangent at B.

Let C B $= a$, A B $= b$, A C B $= \theta$, B D $= x$, A D $= z$.
$\angle$ A B D $= \varphi$, $\angle$ the tangent makes with connecting rod A B.

The resolved part of F in B A = F cos B A C.

$$= F \cos (\text{A D B} + \text{A B D}.)$$

$$= F \cos \left(\varphi + \frac{\pi}{2} - \theta\right)$$

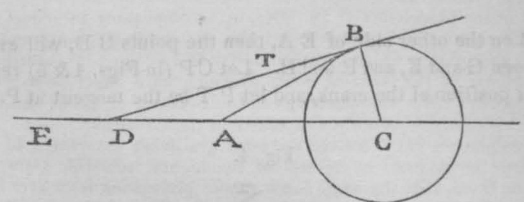
$$= F \sin (\theta - \varphi)$$

$$= f \text{ suppose.}$$

The resolved part of F in B D $= f \cos \phi$.

$$= F \cos \varphi \sin (\theta - \varphi) \qquad \text{A*}$$

Fig. 2.



Investigating equation A, it is evident that the smaller the angle φ the greater the force in B D, and the longer the rod A B, the smaller the angle it makes with the tangent, and thus we have more of the resolved part of the force in B A, in the direction of rotation in the long rod, *à fortiori*, how much more have we of the original force F, transmitted by the piston in the direction of rotation in the case of the long than the short rod.

There is, however, a small arc in the crank's orbit, in which the short rod possesses an advantage, for let E B, F B, be respectively a long and short connecting rod, A G H, the fly, G C H, perpendicular to A E, and let the crank (in Fig. 3) be in such a position that B T, the tangent, bisects the $\angle$ between the rods; let D be the point correspond-

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* The solution of this equation is rather intricate, as we have to express the value of F in B D, in terms of the known quantities θ, a, and b; but, as it is desirable to know the result, we give the working.

$$\text{Now } \cos \varphi = \frac{b^2 + x^2 - z^2}{2bx} \qquad 1.$$

$$x = \text{B D} = \text{B C} \tan \theta = a \tan \theta.$$

$$\frac{z}{\text{A B}} = \frac{\sin \phi}{\sin \text{A D B}} = \frac{\sin \varphi}{\sin \left(\frac{\tau}{2} - \theta\right)} = \frac{\sin \varphi.}{\cos \theta.}$$

$$\therefore z = b \frac{\sin \varphi}{\cos \theta} = b \sin. \varphi \sec. \theta.$$

By substitution in equation 1, we have

$$\text{Cos. } \varphi = \frac{b^2 + a^2 \tan.^2 \theta - b^2 \sin.^2 \phi \sec.^2 \theta.}{2ab \tan. \theta}$$

$$\therefore 2\, ab \tan. \theta \cos. \phi = b^2 + a^2 \tan.^2 \theta - b^2 \sec.^2 \theta\, (1 - \cos.^2 \phi.)$$

$$\therefore b^2 \cos.^{\overline{2}} \varphi \sec.^2 \theta - 2ab \tan. \theta \cos. \phi = (b^2 - a^2) \tan.^2 \theta.$$

Dividing by $b^2 \sec.^2 \theta$ and putting $\frac{a}{-} = 2m$, we have

$$\text{Cos.}^2 \phi - 2\, m \sin. 2\, \theta \cos. \phi = (1 - 4\, m^2) \sin.^2 \theta$$

Completing the quadratic and extracting the root $\Big\}$ $\cos. \phi - m \sin. 2\, \theta = \times \sin. \theta \sqrt{1 - 4\, m^2 \sin.^2 \theta}$.

Now the positive sign must be taken in order that cos. ϕ may be always possible.

$$\therefore \text{Cos. } \phi = m \sin. 2\, \theta + \sin. \theta \sqrt{1 - 4\, m^2 \sin.^2 \theta},$$

$$\text{And } \sin. \phi = \sqrt{\cos.^2 \theta - 4\, m \sin.^2 \theta\, (m \cos. 2\, \theta + \cos. \theta) \sqrt{1 - 4\, m^2 \sin.^2 \theta}}.$$

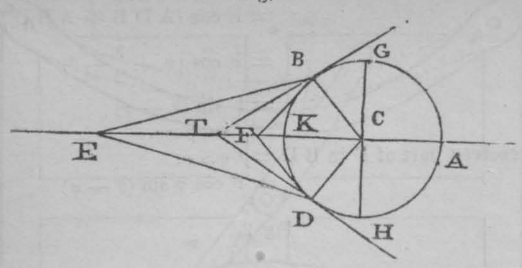
Let X = the resolved part of f, in B E,

then from equation A, $X = F \cos. \phi \sin. (\theta - \varphi.)$

$$= F \sin. \theta \cos.^2 \phi - F \cos. \theta \sin. \varphi \cos. \phi.$$

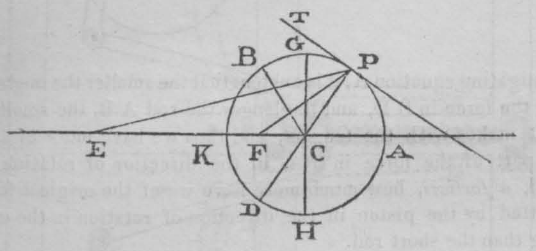
Putting for sin. ϕ and cos. φ their respective values, $X = F \sin.^3 \theta \Big\{ 1 + 4\, m$ $(m \cos. 2\, \theta + \cos. \theta \sqrt{1 - 4\, m^2 \sin.^2 \theta}) \Big\} - F \cos. \theta \sin. \theta\, (2\, m \cos. \theta +$ $\sqrt{1 - 4\, m^2 \sin.^2 \theta}) \sqrt{\cos.^2 \theta - 4\, m \sin.^2 \theta\, (m \cos. 2\, \theta + \cos. \theta \sqrt{1 - 4\, m^2 \sin.^2 \theta}}$, which is the required equation.

Fig. 3.



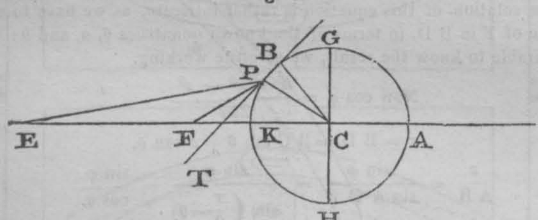
ing to B on the other side of E A, then the points B D, will evidently lie between G and K, and R and H. Let C P (in Figs. 4 & 5) represent the other position of the crank, and let P T be the tangent at P. First

Fig. 4.



suppose the forces exerted by the connecting rods in their *own directions* to be equal, then it is clear (in Fig. 3) their resolved parts in the tangent will be equal, since $\angle$ E B T = $\angle$ F B T. Now from Fig. 5, it will be seen, that while the crank moves from B to K and

Fig. 5.



from K to D, the short rod makes a smaller angle with the tangent than the long one, consequently, through this arc, the short one possesses an advantage; but, on the other hand, in Fig. 4, while the crank moves from A to B, and by parity of reasoning, from D to A, the long connecting rod makes the smaller angle. Hence, if we suppose the rces exerted by the rods in their own directions to be equal, the long od is preferable, since in a whole revolution of the crank, it has the adntage through the arc D A B, which is $>$ arc B K D, through which he shorter one has the advantage. But the forces exerted by the rods in their own directions are not equal, since if F be the force exerted by the piston F cos P E F, the force in the direction of the long rod is always greater than F cos P F C, the force in the direction of the shorter one, except when P coincides with A or K, when they are equal, and thus the superiority of the long rod in the entire orbit in *the transmission of rotary force*, has been satisfactorily demonstrated. Lastly, since the resolved part which produces rotation is greater in the long than the short rod, the resolved part perpendicular to this direction, or tending to the centre of the fly, is less in the long than the short rod; and this resolved part produces friction on the axis of the fly, which is the chief thing to be guarded against.

It is this trifling advantage possessed by the short rod that has induced several clever practical mechanics, with whom we are acquainted, to argue in favour of its superiority; but, whilst we agree with them, that it has the property of pressing at a more favourable angle during the rogress of the crank through a very small arc, they must not forget the gradual increase and decrease of the force exerted by the piston on either side of the dead power point R,† the inequality of the forces in their own directions, and that, moreover, this alleged superiority lasts only during a very limited portion of the crank's entire revolution.

Theoretically speaking then, there is no limit to the length of the connecting rod of a steam engine, but in practice, we are generally confined for space in the erection of machinery; still from the proceding analysis, we should endeavour to make it as long as we conveniently can, in order to obtain the greatest amount of rotatory force, and thus render friction as little as possible. This subject might be practically illustrated, by taking a steam cylinder, furnished with the usual appendages, and connecting the piston rod end to the crank with a rod fitted with a long eye or slot, so that the length of the rod could be adjusted at pleasure. On the crank shaft put a small drum, and suspend a heavy weight, that has to be wound up over it. By comparing the work done in a given time with the same amount of steam from the boiler, (at an equal pressure in either case,) it will be found that the result of the experiment, if accurately performed, will fully attest the superiority of the long rod, as shown in our theoretical deductions.

THE BRITISH MUSEUM.

NEW events produce new institutions. In the beginning of this century it would have been considered a silly freak of the swinish herd to have required the inspection of any architectural design, their functions being limited to mute and confiding admiration, when the doctors had given their fiat that the plaster palace or warehouse church was a master-piece of art. What did the public know of art, and what right had they to interfere? Would they have been allowed to pass their comments on the lath and plaster palace in Buckingham swamp? Certainly not! Neither did architects in those days consider it necessary to pay deference to the judgment of the public or of any one else. It was quite enough that they were employed to do the job, and they put it out of the way in the quietest manner that they could, received the money, and posterity will neither care for the architect nor edifice. The increasing attention paid to English art under the auspices of George III. and George IV. led to the regeneration of public feeling with regard to art, and to those efforts which have been made of late years for the cultivation of the public taste; and as the public have obtained a higher qualification, so they have necessarily required the exercise of higher powers. The throwing open of the British Museum, the extension of the school in it, and the establishment of the National Gallery, have opened the way, which has been followed up by subsequent measures, and it is no exaggeration now to say, that the public have twenty times the power of artistic instruction which they had twenty years ago. The mechanics' institutions have co-operated in this movement by the formation of drawing classes; and the delivery of lectures on art, the extension of provincial exhibitions, or the establishment of art-unions, have fostered the public disposition on the subject. Neither has the government less co-operated; the improvements effected at Hampton Court, the better administration of public collections, the institution of schools of design, and the introduction of drawing as a branch of primary instruction, have all had the same tendency. Contemporaneously a demand has been made on public grounds, on those authorities having charge of new constructions, that the designs should be submitted to public competition and public inspection, and the principle of responsibility to the public voice in the case of architectural works has been fully established. Acted upon by the government with respect to that glorious monument, the New Palace of the Houses of Parliament at Westminster, that principle has been carried out in a most satisfactory manner in the exhibition of the Cartoons, for the

† The circumstance of the piston's motion not being uniform is also in our favour, since the force exerted varies from zero to a maximum, as the piston travels from K to G and from K to H; and whilst this fact renders the advantage spoken of still more trifling, we have the long rod exercising the superiority at a time when the piston's exertion is a maximum.

interior decorations. That this principle cannot be injurious to the artist, we are prepared to affirm; that it must have a beneficial influence, the competition to which we have just alluded has fully proved. The incentive to exertion, the sentiment of responsibility, the foretaste of success, which the artist already feels, all tend to develop the highest faculties, and to produce the noblest works. We cannot, perhaps, in this day, reproduce the feeling of religious responsibility which animated the artists of old, and the want of which has been one great cause of the deadness of modern art; we must, therefore, avail ourselves of the nearest approach which the institutions of the present day afford. The vitality of this principle is thus established, and its general application a matter of necessity. We have already alluded to the happy effects of public responsibility in the case of the Houses of Parliament; we now demand its application in an edifice scarcely less remarkable, and not less popular—we mean the British Museum. This is peculiarly the palace of the people, and it is not unnatural that deep interest should be felt as to the designs contemplated for the approaching completion of this edifice, affording, as it will, in its façade, the opportunity for great architectural display, and having the resources of government available for the purpose. We consider it most essential, both as a matter of principle and expediency that some satisfaction should be given to the public anxiety by the announcement and exhibition of the intended design. These are the views which we most earnestly beg to impress on the proper authorities, and we confidently hope for every attention to the many expressions of the public voice on this subject.

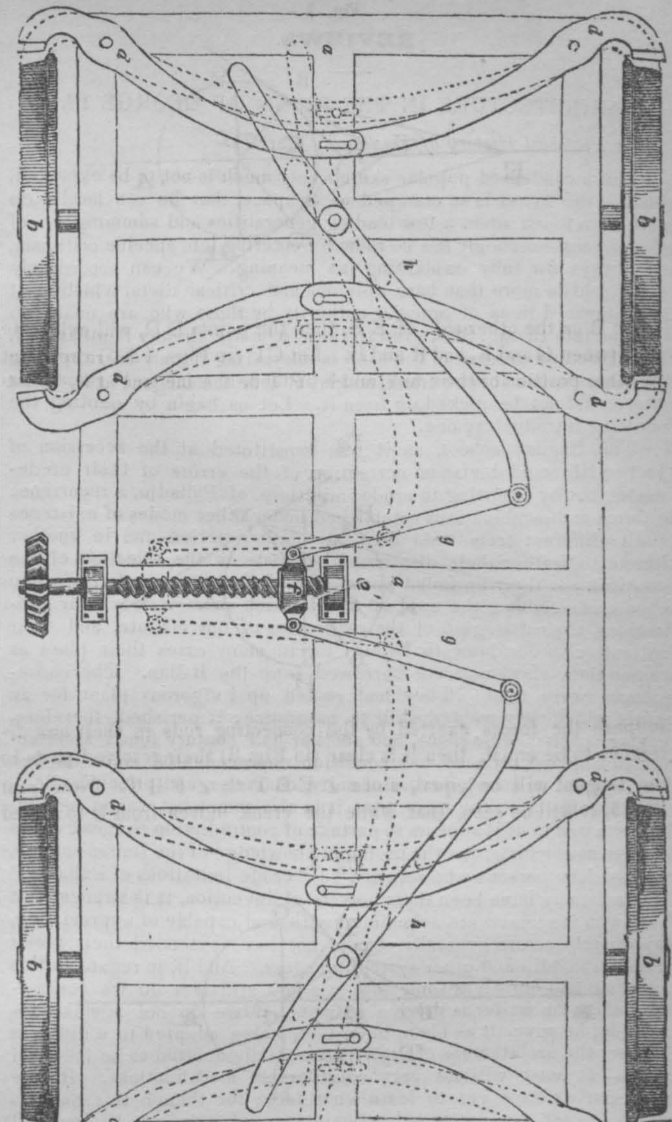
DAVIES' RAILWAY CARRIAGE BREAK.

This railway break has now had a long trial on the London and Birmingham Railway, where it has been adopted to some of the carriages with great success, and has been highly approved on the line. It is the invention of Mr. David Davies, of Wigmore Street, Cavendish Square, who is well-known as an extensive railway carriage builder. The following description, by a reference to the accompanying engraving, which we copy from the *Mechanics' Magazine*, will fully explain the action of the breaks.

a a represent the underside of the framing of a railway carriage; *b b* are the four wheels; *c c* are breaks on the extremeties of eight long levers, whose fulcra are at *d d*; *e e'* is a shaft carrying a shaft carrying a quick threaded screw, working in fixed bearings, and furnished with a bevil wheel *e*, for connecting it with a vertical shaft and handle, led off to any point at which it may be convenient for the breaksman to be stationed; *f*, is a traversing nut, attached by the connecting rods *g g*, to the two cross levers *h h*. There are two mortices in each of the cross levers, through which the break levers pass; these levers are connected by a pin on the extremity of one lever sliding in a slot in an iron plate on the end of that opposite to it, so that any motion conveyed to the one, is simultaneously communicated to the other.

Motion being given to the screw *e e'*, the traversing nut *f* is drawn towards the bevil wheel, which causes the several levers to assume the position shown by the dotted lines, which will occasion the breaks *c c* to press against the circumference of all four of the wheels with immense force, preventing their rotation and converting the carriage into a perfect sledge. This combination of the mechanical powers is so favourable to the development of power, that with such an arrangement it would be almost possible to crush the wheels. In all the breaks we have hitherto seen, there has always been a violent thrust between the wheel and the carriage, or between two of the wheels, tending to break or bend the axles; in the present plan there is not the slightest strain upon the axle, the gripe being exerted on the two opposite sides of the wheel, and the force that might be thus applied with perfect safety, would be sufficient, if applied in the usual manmer, to cause an inevitable rupture in the machinery. Although the action of this break is rapid, it is by no means so sudden as to entail any evil upon that account.

In illustration of the power of such a system of breaks, let us suppose that each of the breaks *c* presents a surface of only three times the area of the bearing surface of the wheel upon the rail, and that the total weight of the carriage is ten tons; it follows then that if each of the eight breaks were pressed against the circumference of the wheel with a force of little more than eight hundred weight, ro-



tation of the wheels would be effectually prevented. When it is further seen that this small force is exerted through the medium of a screw, acting upon a system of levers most advantageously disposed for the multiplication of power, it will be evident that the applicatior of a few pounds to the break handle would instantly arrest the pr gress of the wheels.

NEW BUILDING ACT.

We have a copy of the last bill as amended, and we are happy to announce that in this the amendments suggested by ourselves and others have been fully carried out, and the bill in its present shape, with a few trifling alterations, we should be happy to see passed. As, however, the bill is again referred for further consideration and amendment to Mr. George Smith, one of the city district surveyors, and architect to the Mercers' Company, Professor Hosking and Mr. Thos. Cubitt, the builder, all well known for their practical attainments, we defer going again into the details of the measure until we see the result of their labours and recommendations, which is to be presented to Parliament in the ensuing session. We cannot conclude these few remarks without expressing the obligations under which the profession are to Lord Lincoln, for the readiness he showed to enter into the free discussion of the details of the first bill, and to amend its defects.

REVIEWS.

ARCHITECTURE IN THE REIGN OF GEORGE III.

The Pictorial History of England. Part 74.

FROM a condensed popular sketch very much is not to be expected, because the writer is so cramped as to space, that he can hardly do more than touch upon a few leading generalities and summing up of his opinions—certainly has no room for entering into specific criticism, nor always for fully explaining his meaning. We can accordingly look for little more than bare opinions and critical dicta, which must be acquiesced in as of oracular authority by those who are unable to examine into them. Still, even to those who are already familiar with the subject, an *apperçu* of the kind is interesting if only as refreshing the memory, and it would be strange, indeed, if some fresh remark or other could not be picked up from it. Let us begin by quoting the following introductory one.

"The English school, as it was constituted at the accession of George III, could devise no correction of the errors of their predecessors, but by resorting to crude imitations of Palladio, a recurrence to forms and combinations established under other modes of existence totally different from their own, at another period and in another climate. Neither their discriminating taste in the selection of the beautiful, nor their profound knowledge of the practice of the Italian schools, can redeem the want of *fitness* which characterizes their productions, their disregard of the exigencies of our climate, and their inattention to our domestic habits; for in many cases their plans as well as their elevations are borrowed from the Italian. The consequences were fatal. They had rooted up a vigorous plant for an exotic which they wanted skill to naturalize; it perished, therefore, leaving nothing in its place, and another half century found architecture in England reduced to a condition unprecedented since its first development as an art, devoid of unity, character, and principles."

While this is, in the main, true, it is also somewhat vague and indistinct; and to us it appears to partake of contradiction to speak of the discriminating taste, and the profound knowledge of the Italian schools, possessed by persons who resorted to "crude imitations of Palladio." Feeble as may have been their powers of invention, it is strange that those who it seems were acquainted with, and capable of appreciating, Italian architecture generally, should not have extended their views beyond Palladio and other system-mongers. And if, in regard to this point, we find ourselves somewhat at a loss, still less do we comprehend what the writer is driving at when, if we do not mistake his meaning, he gives it as his opinion that, being adapted to a different climate, the architecture of Italy is essentially unfitted to be followed by us—at least without very considerable modifications. It may be so, but we have yet to learn wherefore; for though this *philosophical* remark is a pretty old acquaintance of ours, we having met with it we know not how many times before, never have we met with even an attempt at an explanation of it. Hardly is there any thing in the constitution of such a style that unfits it in any degree for application in almost any part of Europe. It provides as effectually against weather as any mode of building can do, and therefore the difference of climate must be corrected by other means; instead of marble pavements or inlaid floor, we require thick carpets, good fires, stoves in vestibules, and the like; and instead of sitting with open windows, we are glad to keep them shut. But matters and circumstances of this kind have nothing to do with one mode of building more than another. From what is sometimes said on the subject, it might almost be supposed that every ten degrees of latitude would require quite a different mode of architecture; and also might it be supposed that the climate of England was as severe as that of the most northern parts of Siberia. Changeable enough it is, no doubt, and such being the case, it is impossible to fix upon any mode of building that shall be perfectly suitable as regards all the fluctuating contingences of weather: we have seasons when shade is as inviting as in Italy, and when even the splashing of fountains in marble halls would be a luxury, and when consequently Italian architecture—supposing that is at all concerned with the matter, would be felt to be—for the time at least—the most appropriate of any for ourselves.

Let us test the "climate doctrine" by facts: what say they; is St. Paul's found to be at all worse adapted to our climate than Westminster Abbey? Is Windsor Castle decidedly better so than Buckingham Palace? Are Barry's clubhouses found to be at variance with aught our climate requires? or though they give us the very quintessence of the Italian style, are they not perfectly English in accommodation—as thoroughly or rather infinitely more so than many houses, and very ...ones, too, which exhibit no other style externally than that called the hole-in-the-wall style? Still, our climate, it may be argued, does not admit of arcades and colonnades; why not?—or if not, then our own old English architecture was badly contrived, for that gives us specimens of cloisters and covered walks, which are essentially the same things as the others, differing from them only in style and in name.

The fault lies not in adopting the Italian style—Palladian or any other particular species of it, but in not at the same time *adapting* it to circumstances, and further improving it. And if this be what the writer means, we agree with him, at the same time wishing he had expressed himself more clearly than he has done. Fully do we agree with him in regard to his representation of the state of architecture in this country at about the commencement of the present century. With very few exceptions, indeed, it was deplorable enough: the art may be said to have been in a state of starvation—reduced to the extreme of meagreness and insipidity. Of this, we have most convincing proof, in the *New Vitruvius Britannicus*, which consists entirely of buildings of that period, most of them below mediocrity in point of taste and design, and all, more or less, infected with beggarly mannerism and false simplicity, and marked by nothing so much as the utter absence of all artist-like feeling or study. Even where the glimmering of an idea seems to have presented itself, nothing is made of it; nor is there among the whole collection a single design that is even decently finished-up. The Adams, the Wyatts, and the Bonomis, bedevilled and vulgarized architecture: in their hands, tawdriness, frivolity, dullness, and meanness, became its characteristics. In order to escape the reproach of heaviness, they fell into the opposite extreme of flimsiness; while of simplicity they seem to have had little other idea than nakedness of composition, scantiness of details, and utter disregard of finish—that *sine qua non* in the æsthetics of architecture, let the style itself be what it may. Even when they aimed at richness, the result was seldom more than a sort of *niggling* prettiness; nor was that always consistently kept up. With the Adams, such was generally notoriously the case: their designs, for the most part, exhibit trumpery ornament, patched upon buildings that were not even prepared for embellishment of any kind, being in themselves quite in a state of nudity, as is strikingly the case with the Adelphi, Caen Wood, &c., which are wretched architectural stuff, hardly a degree better in point of taste than our modern gin-palace style. "In the screen of the Admiralty," says the writer in the *Pictorial History*, "Adam surpassed himself. It is a work of great beauty, independently of being the only instance in which he adopted a recognized style in the detail." As to its having much positive merit, however, we do not agree; on the contrary, our opinion more fully coincides with that expressed by another critic, in the *London Interiors*, Part 23, who speaking of the Admiralty screen, says, "It neither agrees in any way with the building to which it is attached, nor is it on a sufficient scale to be at all suitable as a frontispiece to a public edifice; for it looks too much like a reduced copy of what was intended to be nearly double—or speaking more correctly, nearly four times the size, or about 250 feet in length by 45 in height, instead of only 130 by 22." And again, "As far as the Doric colonnades themselves go, they are satisfactory enough, but not so the centre compartment, forming the gateway; for it is poor in its general character, and too much cut up, especially by the plain blank windows or panels in the piers, which while they destroy width (breadth) of surface, produce an appearance of poverty—of the absence of decoration rather than of richness: another more egregious and evident defect is, that over the arch, the architrave and frieze of entablature, otherwise continued thoughout, are omitted, and thus the entablature is maimed and mutilated in the very chief point of the design!"

Adam may very deservedly be commended for one thing—the study he bestowed on his plans, and for the greatly improved, more convenient, and likewise more effective arrangements which he introduced into the interior of houses, thereby contributing to the bettering our domestic architecture, in a very essential point; but as an artist, his taste was even at the best of a very namby-pamby kind.

James Wyatt was in some respects a sort of Adam *riformato*. It was his good fortune to make a decided "hit" by his first work, the Pantheon, in Oxford Street, as to which we are unable to speak, never having seen any designs of it—for none are given in the *New Vitruvius Britannicus*, although that work contains one or two specimens of his, and those not particularly favourable ones;—yet if we may judge from the view of the large room, given in the *Pictorial England*, where it is styled "a noble conception," we should say that it must have been a strangely disjointed and incongruous piece of design, built up with columns in some places, while there were absolute gaps in others. However, the Pantheon was the resort of fashion; the *place* itself was no doubt splendid and gay enough; and when fashion is determined to be pleased, it is generally a very little indeed that will please it. It was the fashion of the day to admire the Pantheon, and Wyatt forthwith became all at once the fashionable architect *par excellence*. Business poured in upon him, and he treated it as business; his business was to please his customers, and please them he did, very much, in several instances, to the displeasure of posterity, for he has since received some hearty maledictions from both architects and antiquaries—from one more especially, who has branded him as "James Wyatt of execrable memory." No doubt very great allowance is to be made for him, when it is considered that the study of Gothic architecture was then quite in its infancy, and even the rudiments of that style scarcely at all understood. Besides, Wyatt did something, were it merely the helping to bring forward that style into notice again, and so far he is justly entitled to a prominent station in the history of the English architecture of the 18th century, albeit, Mr. Gwilt has carefully suppressed his name, while he records such men as Paine and Bonomi. Without any great loss to his fame, much of Wyatt's Gothic has since perished; the castellated palace at Kew—a whim of George III., the House of Lords, and his works at Windsor Castle, have all been swept away, and Fonthill is now a mere wreck; therefore Ashridge is now one of the chief mansions remaining, which he did in that style. Less excuse than for his Gothic can be offered for what he did in the Grecian or modern style, and which is for the most part very mannered and tame. In fact, much as he was favoured by opportunities, Wyatt achieved no really great work, or such as would entitle him to much distinction at the present day, and probably did much less in one sense than he might have accomplished, had his engagements been fewer. He was, too, in one respect singularly unfortunate, for if his Pantheon at all merited the exaggerated praises bestowed upon it, it did not remain long enough to obtain the suffrages and the admiration of posterity, being burnt down about twenty years after it was first erected, and as we have already remarked, no satisfactory memorials of it remain.

Fortunate would it be for the reputation of George Dance, were the front he bestowed upon Guildhall, to disappear as completely as so many of Wyatt's productions have done; for it is a sad blot in his professional scutcheon—so utterly tasteless in itself, independently of its absurdity as an imitation of Gothic, that it is difficult to believe such a piece of architectural "balaam" could have been perpetrated by the man who gave us an edifice so stamped with character and artistic feeling as Newgate. In this last the centre or keeper's house is, however, comparatively a failure: had there been only three instead of five windows on a floor, the effect, not only of that part, but of the whole exterior would have been decidedly better; the original design has besides been greviously impaired by the present miserable attic story substituted for the pediment which crowned that part of the structure, and both harmonized and contrasted so admirably with the rest. Neither Newgate, however, nor the Giltspur Street Compter (which is also by Dance) obtained a place in the *Vitruvius Britannicus*, before referred to; although we there find both the Clerkenwell Sessions House, and the Trinity House—the latter by Samuel Wyatt the brother of James, and a building possessing more of mere prettiness than of either dignity or beauty; whose windows are strangely disproportioned to the order, and the dressings of some of them exceedingly scanty—in fact, little better than a few meagre mouldings.

Though the names of several architects are mentioned by him, the writer of the sketch in the *Pictorial England* scarcely adds any information respecting them, and he is very sparing of dates. In one instance, indeed, we learn from him what we were not aware of before, namely, that the India House is not by the person to whom it has hitherto been universally ascribed; for we are here told—

"Henry Holland was distinguished by the patronage of George Prince of Wales, who prefigured the sort of encouragement the future monarch was likely to bestow upon the arts, by employing him upon that extensive structure of lath and tiles, the Pavilion at Brighton. In 1784, he altered Carlton House, and to him was due the façade, pleasing and harmonious in all its proportions and details, with its beautiful portico, turned to a legitimate purpose by affording shelter for carriages. Holland built Drury Lane Theatre, destroyed by fire in 1809; and the façade and hall of Melbourne House at Whitehall, which remains a memorial of his refined taste. He was likewise *the author of the India House*, usually attributed to Jupp, who was surveyor to the company at the time it was built. It is a common-place design, and the portico ill-assorted to the wings; but porticos were now coming into vogue, which made the impropriety of their association a matter of no importance."

This last observation is just enough, for we have since had porticos stuck to almost every thing of any size—even to Bedlam, and that not only with utter disregard of propriety as to purpose or character, but so as to be completely at variance with all the rest. We are glad to find honourable mention made of the façade of Melbourne, now Dover House: it is, indeed, upon far too small a scale to tell at all to advantage, where it is placed, for it there shows as a mere bit, and is in fact so small, that the intercolumniation of the portico is of necessity much wider than it ought to be: still it is marked by much elegance of taste, classical feeling, and artistical quality. Nevertheless, this piece of design is excluded from the *New Vitruvius Britannicus*, and the same is also the case with Carlton House, while so many uninteresting and exceedingly poor subjects are admitted into it.

We shall probably return to the subject when it is resumed in the *Pictorial* with reference to which we have been speaking; and we suppose that the next chapter of the kind will be the final one, and will continue the history of English architecture down to the end of the first quarter of the present century.

Marine Steam Engines in the Royal Navy.

A letter has been addressed to the Lords of the Admiralty on this subject, and printed, which is likely to excite a good deal of public attention and much controversy among the members of the engineering profession. Mr. Alexander Gordon, the author of it, is, it is well known, the agent of Napier of Glasgow, and consequently, as he suggests, his testimony is open to the imputation of some bias, and he has been induced to bring forward this pamphlet on the occasion of some Parliamentary returns, which he has obtained through the medium of the Hon. Captain Gore. We need scarcely say that the statistics of marine steam-engines are of great importance, both to the nation and the mercantile interests, and particularly at a period when one-fourth of our coasting trade is carried on by the means of steam vessels, and when there is such certain prospect of its still further increase. The deficiency of steam statistics, is, however notorious; and those obtained by Mr. Gordon and Captain Gore are not calculated to alleviate the evil. They are, as we shall subsequently show, deficient in the most important details, and arranged so as to produce particular inferences. If they were not intended to suit particular objects, why is it that the return is limited to the vessels named in the order, and not extended to all vessels contracted for within the period of the last ten years? Had this been done, we should have had the *Medea, Hydra, Gorgon, Driver*, and others, now all kept carefully out of sight, but most necessary for the purpose of instituting any fair comparison, or deducing sound conclusions. Why have we not the dimensions of the engines, the tonnage and dimensions of the vessels, and the consumption of coals?

Again, we have a return of the cost of repairs without any statement of the service on which the vessel has been placed, whether in war service or merely steaming about the coast. Mr. Gordon has himself said enough to show the many circumstances which interfere to prevent a fair comparison being drawn, or fair play being given to machinery; but there are many others no less calculated to show the danger of a comparison of the value of a vessel from the cost for repairs, when the circumstance of the expediency of a vessel is calculated to put it on more severe service, and thus render greater repairs necessary, while an inefficient vessel is shelfed, and thus has neither service nor repairs.

Under all these circumstances we must protest against any inference being drawn from these *very* suspicious returns—so incomplete that on their appearance they deterred us from making use of them. That the government have unconsciously lent themselves to this imperfect mode of inquiry we are convinced, and we trust they will not leave it to individual members of the House in the ensuing session to perpetuate this system, but that they will render that protection to the marine engineers of the country by the publication of accurate and comprehensive returns, which are imperative as an act of justice, after a statement so very injurious, from its incompleteness, has been put forth to the world. We call for this as an act of justice to the marine engine builders of the Thames, the Mersey, and the Clyde, and as a communication of information rendered indispensable by the growing wants of the commercial steam marine, and by the necessity of enlightenment upon this subject to the government itself. Within the last three years not less a sum than 2,000,000 have been expended by the government and the great steam ship companies upon the construction of vessels of the largest class and greatest power. A vast annual expenditure under this head has now commenced, and, as a matter of national economy, it is expedient that we should be able to profit by all the experience of the past. Let us have the dimensions and weights of the engines, the number of strokes they perform, the mean velocity of the vessel, the quantity of fuel consumed, the length of engine room, the contract price, the tonnage and dimensions of the vessel, the peculiar service for which intended (as the Niger expedition,) for instance, what service the vessel

	ALECTO.	PROMETHEUS.	POLYPHEMUS.	GEYSER.	CYCLOPS.	VESUVIUS.	STROMBOLI.	DEVASTATION.
Names of engineers ..	Seaward	Seaward	Seaward	Seaward	Seaward	R. Napier	R. Napier	Maudslay
Original contract ..	£10,700	£10,700	£10,700	£13,933	£22,103	£13,480	£13,480	£18,650
Extras on ditto ..	£297	£315	£214	£440	£906	£400	Nil.	£681
Cost of repairs ..	£1158	£1012	£240	£89	£800	£38	£68	£249
Repairs up to 31st March, 1843, from	Jan. 1840	March 1840	June 1841	July 1842	Oct. 1840	Oct. 1840	Sep. 1840	Dec. 1841
No. of days incapable of working in consequence of repairs ..	393	353	162	50	164	38	51	92
No. and diameter of cylinders ..	Two, 53 in.	Two, 53 in.	Two, 53 in.	Two, 62 in.	Two, 64 in.	Two, 63 in.	Two, 63 in.	Four, 54¼ in.
Length of stroke ..	4 ft. 6 in.	4 ft. 6 in.	4 ft. 6 in.	5 ft. 3 in.	5 ft. 6 in.	6 ft.	6 ft.	6 ft.
Nominal horse power, velocity of piston 210 ft. per minute ..	200	200	200	268	286	280	280	410
Diameter of paddle-wheel ..	26 ft.	26 ft.	26 ft.	26 ft.	27 ft.	26 ft. 6 in.	26 ft. 6 in.	27 ft.
Breadth of board ..	7 ft. 5 in.	7 ft. 5 in.	7 ft. 5 in.	..	7 ft. 2 in.	7 ft. 9 in.	7 ft. 9 in.	8 ft. 7 in.
Depth of boards ..	1 ft. 2 in.	1 ft. 2 in.	1 ft. 2 in.	..	1 ft. 5 in.	2 ft. 2 in.	2 ft. 2 in.	1 ft. 8 in.
Contract price per horse ..	£53 10	£53 10	£53 10	£52	£78	£48	£48	£45 5

In the above table we have added to the government returns the dimensions of the engines.

has been upon, and if it be possible to obtain it through the government engineers, let us know what was the cause of so much delay in the repairs as appears in the returns, and whether the repairs were executed by the government or the engineers. We shall then have some materials from which to judge of the comparative merits of each vessel. We shall also be able to appreciate which engines are the most serviceable—whether the beam or direct action engine be preferable. It is time, indeed, that this question should be settled, for government have now had, or ought to have, some experience on the subject. We know that the beam engine is still the favourite with most of our principal engineers, if not all of them; nevertheless, they all manufacture direct action engines, and several of them have taken out patents. If you ask why they manufacture them, they will tell you the government will have them, and they must comply.

We perfectly agree with Mr. Gordon as to the demerits of the late system of contracting, and think it requires great reformation. Mr. Gordon, in the character of a disappointed candidate, makes fierce onslaught upon it, and deals in home charges, on the Admiralty mismanagements, which is palpable. Hitherto the system of contract has had all the appearance of favouritism, and if persisted in must lie open to the same imputation for the future. We are not, however, inclined, neither does Mr. Gordon seem to be, at present, to throw the tenders open for public competition; but we would have the Government make application to all those firms which are known for their workmanship, whether in London, Liverpool, Scotland, or elsewhere. Mr. Gordon tells us that

"The manner in which tenders are called for, opened, and treated, is worthy of some notice. The contracts for marine engines are made in a manner quite peculiar, unlike all other contracts for the public service. They are made at that office in the Admiralty where no other contracts are made for any of the many supplies and stores for the navy.

"The tenders are, or have often been, opened not in one day and hour, but without regard to the strict rules of tender and contract known and practised in other departments of Government. The clause sometimes thought necessary for protecting the public, viz. that the Board does not bind itself to take the lowest tender, has not been inserted in the application, and the lowest tenderers have been disappointed.

"After tenders have been given in, and after some of the contracts have been made, favoured ones of these very contractors have been allowed to tender for more engines, as in the year 1840, when a London house, having obtained an order for two or three pairs of engines, obtained a further order for two more pairs of engines in the following October by reducing their tender, making orders for five pairs of engines, &c. at one time; no other engineers having had any chance of amending their tenders, or of offering for these other engines."

Mr. Gordon gives us six causes for the inefficiency of so many new steamers as appears in the face of the Parliamentary returns, viz.:

"1st. The novel principle of construction of engines thought necessary for accommodating them to the limited engine-room. 2nd. The attempt to have light engines in ships which must afterwards have ballast to keep them upright. 3rd. Defects in the material and workmanship. 4th. Incompetency of ships' engineers appointed by the Admiralty. 5th. 'Quarter-deck' interference. 6th. Some unavoidable disaster. I believe that all of these may be causes of mischief, but the sixth cause suggested does not seem to have effected the evils so glaringly apparent on the Parliamentary returns. The first two suggested causes are discussed above. The third appears also to have some application. But for any one to attempt to account for such heavy repairs and loss of service by the fourth and fifth, and to lay the blame on engineers afloat and officers in command, would only show a bad selection of the one, and an inexcusable interference of the other."

We perfectly agree with Mr. Gordon as to the necessity of a higher rating for engineers in the Navy, with so many engineering offices connected with that department, and the demand for engineering talent which exists there, we think it is absolutely necessary that proper measures should be taken to secure the services of the educated members of the profession. The rating of another class of scientific officers in the navy could not but fail to promote that high standing which the navy is taking as an educated profession, while the many subsidiary advantages which would accrue from having the services of engineers available requires no comment.

As to that subject upon which so much reluctance has hitherto been exhibited, a return of the consumption of coals, no difficulties it seems to us stand in the way. It can surely be told how many tons of coals are put on board a government vessel, and the description of them, at any rate we cannot see why returns given by the officers of the private Atlantic steamers cannot be given by those of government vessels. As Mr. Gordon observes, a difference of one pound of coal per horse power per hour would make a difference to the country of £10,000 a year. We think an annual return should be made imperative.

We have the returns of duty of Cornish engines, and accurate returns of the consumption of railway engines, and we know the economy which has resulted from the experience thus afforded. Annual returns should be published, which would operate as a check upon the coal owner and upon the engineer; and we do not see why a system of premiums for economy in the consumption of coals should not be introduced among marine engineers as it has already worked with good effect upon the Belgian railways and some of the English.

As we have already observed, before we can come to the same conclusion as Mr. Gordon, we must have more extended returns, and more accurate information. It is not fair to the parties to judge them by what is now before us, and as Mr. Gordon appears to have had something to do with obtaining the present returns, we hope in the next session he will take care to prevail upon Captain Gore, or some other member, to move for the extended information we have now required.

Account of the Museum of Economic Geology. By T. SOPWITH, F.G.S. London: John Murray, 1843.

The institution of this museum is an event which cannot but be considered as most valuable to the engineer. It is a recognition by the government of the great advancement of engineering science, and of the influence which it has had in systematically developing the resources of the country. The labours of the engineer have opened up districts not before available, and the development of the means of communication have now given the public an interest in every locality. Under such circumstances a knowledge of our mineral treasures, and of their useful applications, is indispensable, and the establishment of a museum was the most fitting means for effecting this. The establishment formed at Craig's Court, Charing Cross, consequently merits the visit of the student and professional man; and the descriptive account of Mr. Sopwith is one of the best guides he can have on the occasion. Mr. Sopwith has devoted much attention to this subject, and his shilling manual is a most readable and instructive book. The Museum is open to the public gratuitously every day, excepting Sunday, from 10 o'clock till 4, from November to February, and until 5 o'clock during the rest of the year.

"The Museum of Economic Geology, as now arranged, comprises an entrance hall or lobby, an apartment on the ground floor 46 feet long, and 18½ feet wide, and a gallery on the first floor 103 feet long, varying in width from 17 to 25 feet. The department of the Office of Mining Records comprises a Record Office 26 feet by 25 feet, in which are tables for drawing plans, and a gallery on the second floor 103 feet long, containing mining implements, and models of mines and mineral districts, and of various engines, machines, &c., used for working and draining mines. In addition to these are a laboratory, conducted Mr. Richard Phillips, F.R.S., the curator of the museum; a workshop in which models are constructed, under the immediate direction of Mr. Jordan; and a small library or private room for the use of the director. To these apartments additions will doubtless be made from time to time commensurate with the national usefulness of the establishment, and the more so, as, owing to the extensive opportunities afforded by ordnance geological surveys, and the great liberality of numerous owners of mineral property, and other public-spirited friends of science, a large proportion of the valuable contents of this museum have been, and will assuredly continue to be, received without any expense beyond the mere carriage of the specimens. It is gratifying also to know that the present administration cordially approve and support the arrangements of this museum, which was commenced by their predecessors, and by their attention to its interest, evince their regard for those foundations of our national wealth, a knowledge of which, as Sir John Sinclair has justly said, is of more importance to this country than all the mines of Mexico and Peru."

Launch of the Great Britain.

Mr. Davis has got up a lithograph on this subject from the able pencil of Mr. Thomas Allom, which possesses merits not only of artistic treatment, but of accurate delineation. The view was taken immediately after the launch, and the fidelity of it is evident, as also in the case of the adjacent scenery and minor details. It is certainly one of the best representations of the *Great Britain* which has yet appeared; and equally an ornament to the office as to the drawing-room. We extract the following account of the details of the vessel and engines, which are appended to the engraving, and we understand are authentic.

Keel laid Dec. 19, 1839; floated July 19, 1843.	feet	in.
Length extreme, from figure-head to taffrail	322	0
Do. on upper and forecastle decks	308	0
Do. between perpendiculars	286	0
Extreme breadth	50	6
Depth at midships	32	6

She is divided into four compartments by means of iron bulkheads, ½ in thick, viz., 1st, forecastle; 2nd, fore saloon; 3d, boiler and engine-room; 4th, after saloons.

		ft.	in.		ft.	in.		ft.	in.
Promenade saloon forward	length	67	0	width	21	9	height	7	9
Do. do. aft	„	110	0	„	22	0	„	8	0
Dining saloon forward	„	61	0	„	21	9	„	7	9
Do. do. aft	„	98	6	„	30	0	„	8	3

26 state bedrooms with one bed, and 113 with two beds.
Tonnage, builder's measurement, 3,446 tons.
Draught of water when loaded, 16 feet.
Do. without cargo, 12 feet.
Do. without engines, 9 feet.
Displacement of water when drawing 16 feet, 2970 tons.

ENGINES AND BOILERS.

Nominal power, 1,000 horses.
4 cylinders 6 feet stroke, diameter 88 inches.
Slide valves, diameter, 20 inches.
Air-pumps (2), 54 inches.
Steam pipes, 18 inches.
Condensers (2) formed of wrought iron plates ¾ in. thick, 12 feet long, 8 feet wide, 5 feet deep, and contents 510 cubic feet.
Bed plates for cylinders (2), length, 27 feet.
Do. do. weight, each, 16 tons.
Main shaft wrought iron, length, 15 feet 9 inches.
Do. at centre, for driving wheel, 2 feet 3 inches.
Do. for eccentric bearing and cranks, 2 feet 1 inch.
Do. weight in rough from the forge, near 17 tons.
Framing to carry same is of hard wood, 12 in. thick, cased with wrought iron plates, ½ inch thick.
Boilers having 24 fires, 12 fore and 12 aft, each 6 feet by 2 feet—length, 34 feet, width 32 feet, height 21 feet 6 inches.
Total surface of fire bar, 288 feet super
Chimney 8 feet diameter, height 34 feet.
Screw propeller, 16 feet 6 inches diameter.

EFFECTS OF LIGHTNING AT SEA.

A paper from the commander of the *Vigie*, with an account of the effects of electricity in a recent voyage, was read at one of the recent meetings of the Academy of Sciences. It states that the mainmast was three times struck with the electric fluid very severely, but that no damage was occasioned to the vessel, in consequence of its being provided with paratonnerres. A sailor was sent up to see what effect the electric fluid had on the paratonnerre, and as soon as he reached it, he experienced such shocks as nearly caused him to fall down, and he felt the same every time he placed his hand on the base of the paratonnerre. It had become a magnet. The same effect had been produced on every piece of iron in the vessel. The compasses too had their needles disarranged, and would no longer serve to guide the ship. Eight or ten days after, the *Vigie* met another vessel, and obtained one of her compasses, but the magnetic action communicated itself to this one, and the instrument became useless.

THE NEW HOUSES OF PARLIAMENT.

SECOND REPORT OF THE COMMISSIONERS ON THE FINE ARTS.

To the Queen's Most Excellent Majesty.

We, the Commissioners, appointed by your Majesty for the purpose of inquiring whether advantage might not be taken of the rebuilding of your Majesty's Palace at Westminster, wherein your Majesty's Parliament is wont to assemble, for the purpose of promoting and encouraging the fine arts in your Majesty's united kingdom, and in what manner an object of so much importance might be most effectually promoted, humbly report to your Majesty, that having, in furtherance of the objects proposed by us in our first report, and sanctioned by your Majesty, invited a competion in cartoons, we have now humbly to state to your Majesty that the competition referred to has taken place, and that we are satisfied with the evidence of ability afforded, not only by the works of the successful candidates, but those of many others.

Having satisfied ourselves respecting the attainments of many British artists in the practice of cartoon-drawing, and respecting their capacity to attain excellence in those qualities which are essential in historical painting, we now propose, in pursuance of the plan before announced by us, to invite artists to exhibit specimens in fresco-painting of a moderate size, which, by being portable, will enable all candidates for employment in that method of painting to send in works exhibiting their qualifications therein as painters and colourists, and which, taken together with the larger compositions in drawing which they have exhibited or may exhibit, and with other existing evidences of their talents, may enable us to proceed to the selection of artists for the decoration in fresco of certain portions of the Palace. Nevertheless, as paintings executed in other methods may be free from a shining surface, and may therefore be deemed by some artists to be fit for the decoration of walls, we have invited such artists to exhibit specimens of the methods in question, and shall regard such methods as open for consideration.

With respect to sculpture, we have announced that various statues will be required for the decoration of the Palace, and we have invited artists to exhibit models, in order to assist us in the selection of sculptors to be employed.

With regard to decorative art of various kinds—namely, glass-staining, arabesque-painting, wood-carving, oramental metal-work, and ornamental pavements, we have, in like manner, issued notices inviting artists and others to send in specimens, in order to assist us in the selection of persons to be employed.

We have further humbly to state to your Majesty, that the claims of candidates for employment in oil painting, and other departments of the art besides historical painting, will be considered hereafter, and that the order in which the several branches of art and decoration applicable to the embellishment of the Palace have been considered by us, has been, and must continue to be, determined by the time requisite for the preparation of the works, the study required by the artists in modes of execution which are new to them, and by the progress of particular portions of the building.

We humbly subjoin, as an appendix to this report, some papers treating in detail various matters connected with the subject of our inquiry, and explanatory of the proceedings of the commission; and, with respect to the architect's report, have to state that we have taken it into our attentive consideration; but although we have, in consequence, issued various notices calculated to assist us in coming to a final decision thereupon, we are not yet prepared to lay any specific recommendation before your Majesty, both in consequence of the building not being sufficiently advanced, and the result of the inquiries and experiments made and making by and under our direction not being sufficiently ascertained, to justify us in coming to any final conclusion in this respect. And with reference to that part of the architect's reports which relates to local improvements in the neighbourhood of the Palace, we consider that, however deserving of attention the improvements in question may be, they do not come within the inquiry with which we are intrusted.

ALBERT.	COLBORNE.
LYNDHURST.	CHARLES SHAW LEFEVRE.
SUTHERLAND.	ROBERT PEEL.
LANSDOWNE.	J. R. G. GRAHAM.
LINCOLN.	ROBERT HARRY INGLIS.
ABERDEEN.	HENRY GALLY KNIGHT.
J. RUSSELL.	B. HAWES, JUN.
PALMERSTON.	SAMUEL ROGERS.
MELBOURNE.	THOMAS WYSE.

Whitehall; July 28, 1843.

[Here follows Mr. BARRY's Report which we published in the *Journal* last May, page 173.]

EXTRACT FROM THE REPORT OF THE COMMITTEE ON WESTMINSTER HALL.

Your committee, to whom was referred the duty of making investigations respecting the ancient state and modes of permanent and temporary decoration of Westminster Hall, and respecting the dates and extent of its architectural alterations, have the honor to report—

That they have examined Westminster Hall with a view to the objects of the inquiry committed to them.

That they have reason to believe that the original hall of King William Rufus occupied the same area as the present building.

That they believe, that whatever portion of the fabric of the Norman hall of the palace of King William Rufus may remain, it is entirely encased and concealed by the walls of the actual structure.

That the walls of the actual structure, as they now appear, with the exception of the surface alterations made in 1806-7, and also the existing roof, were erected in the reign of King Richard II., in the year 1398; the walls being then heightened, and the original rubble of the Norman work being then encased in ashlar, and the buttresses added.

That they have no reason to believe that there were any permanent decorations in the interior of the said hall other than those which now exist.

That the temporary decorations on occasion of state trials, or of coronation banquets, varied with the need and propriety of the service to which the hall was applied.

That in the last year of the reign of King Richard II., the hall appears to have been "hung and sumptuously trimmed," by which phrase your committee understand hangings of tapestry and other temporary decoration; but that there is no reason to believe that there was at any time any decoration of painting of any kind on the walls: though in making this observation it is right to add, that your committee feel that there is in the existing hall sufficient light for the proposed exhibition of cartoons.

That the use of banners and trophies suspended from the roof or rafters of the hall was not earlier than the reign of Queen Anne, and was soon discontinued. And in respect to the last subject of inquiry remitted to them, so far as the same has not by anticipation been already answered by the statement that the hall is substantially unaltered, your committee find, that in 1821, the two courts of justice which were excrescences on the south side, and which were comparatively modern erections, were removed; that a door in the centre of the south end was opened; that two smaller doors at the sides were closed; that a row of dormer windows was opened in the roof on each side, and certain doors opened to the courts of law on the west side.

Your committe observe that one of the windows on the east side has been partially closed, two windows adjoining the same having been originally closed externally, so far as it appears by the clock tower of the ancient palace rising directly against them, and still obstructing them, though it was reduced in height by the late Mr. Wyatt in the course of the works which he conducted in 1806-7.

ROBERT HARRY INGLIS.
HENRY GALLY KNIGHT.
HENRY HALLAM.
GEORGE VIVIAN.

Whitehall, March 24, 1843.

PAYNE'S WOOD PATENT.

IN the House of Commons on Wednesday, August 16, Mr. Barclay put a question to the noble lord at the head of the Woods and Forests, respecting Mr. Payne's patent process for preserving timber from dry rot, and the ravages of insects. He understood that the properties of the patent to this extent had been pretty fully tested, and more than all by the department over which his lordship presides, and that it had been satisfactorily shown that it had the property of rendering wood prepared by it uninflammable, or at any rate of depriving it of a large degree of combustibility. Lord Lincoln said he felt most happy to give the honourable member the fullest information he possessed on the subject. The matter had been brought before him in his official capacity, and he had thought it right to take considerable pains to be well informed on so important an invention. He had paid a visit to the premises, and inspected the very ingenious machinery and process of Mr. Payne, but not liking to trust his own judgment in a matter where great professional skill was essential, he had directed Mr. Phillips, professor of economic geology, to examine into the invention and report upon it. That report the noble lord said was highly favourable; and since then he had directed the erection of a structure in his department in which the process had been applied to all the timbers, and under the inspection of the woods and forests surveyors. He had no doubt himself of the great value of the invention, and believed that experience would confirm his present favourable opinion, but time would be necessary to test it. The Admiralty had applied to him on the same subject, and a similar answer had been returned to them. He should be happy to lay before the hon. member for Sunderland the report of Mr. Phillips. Mr. Barclay thanked the noble lord for his satisfactory statement, and moved that the report be laid upon the table of the house, which was agreed to.

A STEAM METER.

M. Clement has invented an instrument which he calls a manometric thermometer, for measuring the temperature and tension of steam in boilers of high and low pressure, and particularly to prevent accidents by explosion. It is formed of two strips, one of which is silver, and the other of platina, rolled up in a spiral form. These strips are soldered together, and one of the extremities is fixed, while the other is attached to a copper vertical rod. Owing to the difference in the dilation of platina and silver, when the temperature of the instrument varies, its upper extremity imparts a movement of rotation to the copper rod, which is communicated by means of a rack-wheel to two hands, which indicate the variation of temperature.

THE AMICABLE ASSURANCE OFFICE, FLEET STREET.—Tenders delivered August 16, 1843.—S. Beazley, Esq., Architect.

STONE FROM	PORTLAND.	NORFAL.
Messrs. Webb	£10,752	£11,000
Mr. Dixon	10,700	10,995
Mr. Herbert	10,640	10,845
Messrs. Cubitt	10,610	10,860
,, Soward and Son	10,590	10,850
,, Grissell and Peto	10,506	10,746
,, Lee	10,280	10,400
,, Woolcot and Son	10,178	10,478
Mr. Winsland	9,800	9,887
Messrs. Piper and Son	9,754	9,954

The Directors have decided to have Norfal stone, and accept Mr. Winsland's tender. The works have commenced.

PUBLIC WORKS IN PARIS.—The *National* observes, that it is not without interest to consider the sums expended within the last 24 years in the improvement and embellishment of Paris, which have rendered it one of the finest cities in the world.

	Francs.
Expended on works relative to the distribution of water, aqueducts, reservoirs, fountains	30,986,347
In flagging and paving	17,644,061
In purchases for enlarging the public avenues	39,047,708
The construction of commercial edifices as well as in objects of art and decoration	62,984,919
In the purchase of ground necessary for those edifices	17,802,729
Total	168,465,764

REMARKS ON THE PRESENT STATE OF ARCHITECTURAL TASTE AND PRACTICE IN OUR LARGE TOWNS.

(From the North of England Magazine, June 1843.)

I.—General Principles of Architecture.

The state of architectural taste in this country is confessedly very low and imperfect, and does not receive that degree of attention and regard which from its nature and importance it deserves. As the subject of taste does not touch our personal comforts and wants, it is apt to be regarded with indifference, by many, who have means and opportunities of encouraging the art and influencing its practice. It would not be right to say that the majority of such individuals disregard this subject from the direction of their habits and tastes lying altogether, or chiefly, in personal gratification; but, I believe, there are many individuals who, having made it the business of their lives to acquire wealth, and, from association and circumstances, been led to regard material comforts and ease as the chief end of their every-day life, have had no favourable opportunity or stimulus to the cultivation of those refinements of sense and feeling, which embody themselves in the productions of the fine arts. It is true mental endowments are possessed and cultivated in a very high degree by people of all classes, and the present age is immensely superior to any previous one, if not in the profundity, at least in the variety and almost universal diffusion of its scientific acquirements; but this eminence is almost entirely intellectual: it evinces little refinement of taste or feeling, or lively perception of the beautiful.

I do not intend the above remarks to apply, by any means, universally; but they apply, I think, equally to all classes. The middle and lower classes have not the opportunities which are possessed by the upper, of testifying their taste in architecture, but as far as I am able to judge, the latter do not evince that superiority, which from their position might have been expected. There are indeed many distinguished exceptions. There are many who have a very high appreciation of excellence in this art, but still that the censure deservedly applies to us generally, cannot, I think, be denied. Without attempting to account for this state of taste, I merely remark that the effect is in some degree aided, in manufacturing towns at least, by the fact of the mind becoming habituated to the contemplation of works of mere utility in the shape of mills, warehouses, &c., and that the principles which determine their character are unconsciously, but very improperly, applied to works of a totally different nature.

The art, as well as the literature of the present day, is too much a subject of fashion and caprice, and depends too much on the particular taste of the public which may happen to predominate at the time; this remark applies especially to architecture. It may, perhaps, be said that such has been the case in the best ages of antiquity, but it will be found on examination, that the changes which were always going on in style, among the Greeks for example, took place when the art was advancing towards perfection, and were the result of a deep study of its principles and capabilities, and of the variations which are always going on in the manners and customs of a partially civilized people. Our architecture, on the contrary, wants character, and application to the circumstances of the times. A building ought to grow without effort and almost unconsciously out of the wants which call it forth, and should be the result of these, produced under the direction of taste. It is this which makes the remains now existing in Greece, Egypt, &c., so interesting and valuable, as monuments of the past history of those nations; and it is only by working on these principles that we can give our buildings either character or interest.

We must go back to first principles, and apply them to our wants and circumstances. Such is our want of character, that if half-a-dozen of the principal public buildings, which have been erected in this country within the last half century, should be examined a thousand years hence, without accompanying history or tradition, it would be a more puzzling question than has ever yet been proposed to the antiquary, to determine the character, civil or religious, of the people who could raise monuments so various and anomalous. Fortunately the doubt is as to their surviving one century instead of ten. In addition to this prevailing ignorance and indifference to architectural excellence, the architecture of the present day is subjected to the pernicious influence of what is called by some economy, but which is often more akin to meanness. It has been said by an eminent living architect, "Economy is the bane of architecture;" but it is only false economy that architecture has to dread; and I cannot but think that true economy, properly directed, would exercise a very beneficial influence on works of architecture. How often do we see individuals and committees, in attempting to avoid the charge of economy, falsely so called, and to acquire a reputation for liberality and taste, actually commit a much more egregious error than the one they seek to avoid. The result in such cases is often little better than ostentation and a paltry regard for appearances; the works are sure to be all outside, and what little enrichment they do possess, is invariably in the most conspicuous places, to catch the eye of every casual observer. A glance is sufficient to show all the beauty or interest they possess, and when once seen, little desire is felt for a second inspection. How few of our modern buildings offer any temptation to explore and examine their beauties. What have we to compare with our old cathedrals, abbeys, or even small country churches, where almost every visit reveals some new beauty, or tends to deepen the impression of former ones; and this, independent of all interest arising from association?

The ignorance from which all these evils spring, is unfortunately not confined to the public generally, who cannot be expected to possess any profound knowledge on the subject, but is very prevalent among even professional men. It is much to be wished that some standard of proficiency were established, by which the competence of all desiring to enter the profession might be tested; for it is notorious, that comparatively few of those practising as architects, in some of even our most important towns, are really competent by talent or education, to do credit either to themselves or to the profession. That this opinion is founded on jealousy or ill will, I think no one, who looks round on the different buildings in the neighbourhood of Manchester or Liverpool for instance, will assert. With few exceptions, all the buildings in those towns which display real taste, or evince originality of conception, are by non-resident architects; but it would be invidious to remark further, than merely to mention the fact, as regards these localities. Happily this wide-spread ignorance is now beginning to disappear before an increasing zeal for the cultivation of the art, and investigation of its principles; and it may very safely be prophesied, that the more it is studied and understood, the more will its claim to a high place in our regard be acknowledged.

I do not consider it necessary to say anything in defence of the fine arts in general, or of architecture in particular. The time is gone by for its being looked upon as an art merely of utility; and there are few now who will venture to deny its beneficial tendency to elevate the mind to the perception of refined and intense pleasure. I may remark, however, that if taste be important and worthy of cultivation in the fine arts generally, it is particularly so as regards architecture, as the productions of this art are costly, and their influence, whether beneficial or otherwise, lasting as themselves. Besides, buildings of some sort or other cannot be dispensed with, and, being open to the view of all, must have a very extensive influence on the public taste.

I propose first to lay down, and explain as familiarly as I can, some of the chief fundamental principles of the art, including nothing but what may be called the postulates, or self-evident truths, which are really very few and simple, and on which it will be my endeavour to found all the subsequent remarks I may have to make. The chief difficulty in the way of the free reception of the truth of these principles, and the propriety of their application, to our every-day circumstances, is that of divesting the mind of prejudice, or that effect of long habit in viewing objects of a particular character as perfect, or least without at the time feeling conscious of their defects. Almost the whole of architectural rule may be comprized in one idea, which applies equally as a test of excellence in all the arts, viz., *Fitness or Propriety*. It is unnecessary to adduce any proof or even illustration of this, as it would obviously be useless to argue with one who would deny that a thing is good or excellent, in proportion as it serves the purpose for which it was intended, without redundancy or deficiency, and as it accords with propriety of feeling and character. This principle applied to works of architecture, ought to enable a competent and unprejudiced mind, on viewing a building, to ascertain at once, or at least to form a tolerable conjecture, as to its purpose and destination.

This fundamental principle may be considered under three heads, viz.:—1st, *Convenience;* 2nd, *Construction;* and 3rd, *Character*, including Form and Enrichment. All these departments are of course modified and controlled by economy, and also combine with and control one another.

We shall consider first, *Convenience*, which will determine the number, size, and arrangement of the different portions of the edifice, according to their use and purpose. These considerations are so various and extensive, that it would be both tedious and out of place to enter into an examination of them now. I may, perhaps, at a future time notice some few instances in which our practice is defective. When this distribution, depending on convenience, is determined, the next subject demanding attention, and which is, perhaps, the least regarded, is *Construction*. This includes considerations of material, climate, and durability. As to material, that is obviously the most proper to be used, which possesses in the highest degree the requisite strength, durability, and resistance to climate. There are three classes of materials commonly used in buildings—1st, those which are best adapted to resist compression, as brick, stone, &c.; 2nd, those best adapted to resist cross strain, as wood; and 3rd, those which resist tension, as iron. Now, it is important to remark, that from the totally different qualities of these three classes of materials, they require in construction, a totally different mode of treatment! thus, the first class are obviously best suited for external and internal walls, those parts of the fabric in short, on which all the rest must depend;—the second class are best adapted for horizontal and oblique bearings, as in floors and roofs, and the third are calculated for ties, and for various other minor purposes. Of course, there are peculiar circumstances in which the application of these materials may vary, but the above are the general and obvious uses to which they are best applied. The climate also exercises (or I should say *ought* to exercise, for in this country it does not) a very considerable influence, not only on the material employed in building, but also on the forms and features, as pitch of roofs, &c.

Now these general principles, simple and obvious as they may seem, and indeed are, are very often disregarded in practice, which is one cause of so much incongruity and want of character in our architecture. I may also mention now, in connexion with propriety, another very important fundamental principle, forcibly expressed by Pugin in his "True Principles of Christian Architecture," and a disregard of which is a chief source of error in this country. I mean that "the construction of a building should avow itself:" there should never be any attempt to conceal the real structure, by a sham apparent one. This every unprejudiced mind will allow; it is, in fact, only a consequence of our first rule of fitness. The mind must be satisfied on this point before it can derive pleasure through the senses: for let an object be ever so beautiful in form and enrichment, if there be any misapplication of materials, or any attempt at deception; if it betray any mean device or contrivance by which it is made to assume (in material or otherwise) a character not properly belonging to it, a refined taste can never but be disgusted with the deceit; while all the beauty which may belong to the mere form tends only to increase the feeling of dissatisfaction which such an object would excite. In addition to what Pugin has said regarding the concealment of construction, I should say that, as a general rule, we should not only not take pains to conceal it, but that we should also, as far as practicable, expose the real construction to view. Every essential part of the structure should be apparent. Another rule which follows from the above is, that every object in art should be in form, colour, and dimension, just what would be in accordance with the nature of the material of which it consists. It was on these fundamental principles that the magnificent works of the Greeks and Egyptians were executed, and also those wonderful structures of the middle ages, which adorn every quarter of our island.

The rules above given are constantly violated in the present day. We see in all parts of the country, but especially in the neighbourhood of manufacturing towns, hundreds of houses which every body knows to be built of brick, but which from some fancy or other, are made to appear as though they were built of stone, betraying at once, the pride of the proprietor in desiring an expensive material, and his poverty in being unable to obtain it The practice is so universal, that many, I have no doubt, do not see the matter in this light; and many follow the custom, because it is come to be considered necessary for maintaining a respectable appearance; but I believe that pride originated it, and that when it is analyzed, it will come to what I have stated. Another instance in which plaster is improperly made to assume the appearance of stone, is very frequent in churches, entrance halls, &c.; it consists in lining it in imitation of large square stones. Now this being a deception is sufficient at once to condemn it, but it also has a very chilling and comfortless effect, and the practice ought to be abandoned. If I recollect rightly, Pugin has in the new catholic chapel at Birmingham, left the surface of the plaster quite plain and rough, a practice certainly not to be recommended: but he may, perhaps, look forward to its being ornamented at some future time, when means will allow. I am quite willing to admit the propriety of plastering interior walls, and also the desirableness of relieving the monotony of a plain flat surface, but there are other and more legitimate means than the one just noticed, of doing this, which may be used according to circumstances. For churches or chapels, where there is a great breadth of bare wall, the best way, as well as the most obvious, would be to impress the plaster while soft with an appropriate device in the way of seal or stamp, which would at any rate be consistent with the nature of the material, and would afford ample scope for ingenuity and beauty at comparatively small cost. The other methods of avoiding monotonous surfaces of plaster are in common use, viz:—painting and papering, and are perfectly legitimate when applied consistently. But we frequently see walls and ceilings painted in imitation of panelling, or of some other material, as marble and costly woods, all which are bad, because they are attempts at deception, and for the same reason, paper hangings which exhibit natural objects, raised apparently from the surface of the wall, whether in colours, or mere light and shade, are improper. The ornamental pattern on the paper may be as simple or as rich and complex as the character of the apartment requires, but to be in correct taste, it is essential it should appear as a flat surface. Imitation of woods, marbles, &c. in plaster, either by painting or otherwise, are just as bad as imitations of stone by plaster on the outside of a house; for though the finer woods and marbles may possess more beauty than commoner materials, the chief motive for imitating them is the desire of displaying costliness without incurring cost. If these remarks are well founded, I think the use of scagliola cannot be justified on the strict principles of taste. Even the plainest materials are more satisfactory than the most beautiful imitation of the costliest woods that ever were seen; indeed the more costly the material imitated, the more unsatisfactory the result, as the probability of its being sham is increased in proportion.

But to return to the consideration of brick and stone. Brick is best adapted for plain walls, because if well burnt, it is more durable than stone, more impervious to weather, and in many places is much cheaper. Both propriety and economy, therefore, point to it as the most proper material for general use, in such localities. But on the other hand, brick cannot be used where cutting is required, here its place can only be supplied by stone; but there is a very simple method of ornamenting brick buildings, which seems to be almost unknown or forgotten amongst us, viz., by moulding the bricks into different forms and ornamental devices, and by using bricks of different colours, as red, blue, and white. In this way a true artist would be able to produce many beautiful and picturesque effects; bands or string courses might be thus formed either by impressed patterns, or by a different coloured brick; chimnies might also be made highly ornamental, all which would be in perfect propriety, and might be obtained at a trifling cost, without the use of stone at all. However, the judicious use of stone in combination with brick, as round the windows, doors, &c., and in cornices, gives rise to many striking effects which could not be obtained with brick alone. This mixture of materials is most properly employed in ordinary dwelling-houses, or where very little carving is required; but where this is abundant and elaborate, as in a church, the use of brick should perhaps be discarded altogether, as it would form too small a proportion of the wall to justify its introduction, on the score either of durability or economy. This was no doubt one reason amongst others, why the churches of the middle ages were almost invariably built of stone; but it cannot be urged as a reason for employing this as a sole material for ordinary dwelling houses. Here, good taste requires that economy be consulted, and economy will, in many parts of the country at least, point to brick as the most proper material. But for sacred edifices the case is quite different. In these, economy is hardly excusable except in extraordinary instances; and as stone is undoubtedly the most dignified material, great exertion ought to be made to secure it.

As for timber and plaster buildings, I do not think there is much probability of their becoming general, though instances do now and then occur of houses, not indeed of timber, but of brick, painted to imitate the old style of timber house. This is actually worse than imitating stone in plaster, because it is disguising a good and honest material in the garb of one decidedly inferior. Must we then give up for ever all imitation of those beautiful and picturesque examples of this style, once so ornamental to our ancient cities? We must: no circumstances can now arise, which can give any occasion, or call, for such a mode of construction. Ancient remains are, no doubt, very picturesque and beautiful, and their beauty is of a kind too which cannot be transferred to any other material. But the old builders did not employ wood in the construction of their houses, for the sake of the beauty or effect they could thereby impart to them; the timber was employed for convenience and economy, and its accompanying beauties were superadded, and were the result of the taste and feeling of the builders. And as we must discard the use of wood for such purposes, we must also be content to forego its accompanying and characteristic beauties, and employ our taste and ingenuity and love for the beautiful, as they did, on the materials best adapted, by convenience and economy, for our wants.

The legitimate use of timber in construction forms the next subject for consideration. The nature of this material points so obviously to its proper application, that it would be difficult to go very far wrong. But I must take this opportunity of noticing the universal practice of concealing it from view. What reason can there be for thus hiding a most essential part of our architecture? It is only another result of the blind admiration of the classical styles which has now prevailed so long. What I complain of is the use of plaster ceilings to conceal the construction of floors and roofs. "What," says a writer, in the *British Critic*, "is the theoretical notion of a flat plaster ceiling?" What portion of the construction does it represent? It more nearly resembles "a vast marble slab" than anything else substantial. This absence of reality gives to a room an appearance and effect of incompleteness, and consequently of discomfort. In spite of habit, I am frequently tempted, when looking up at a flat plaster ceiling, to ask myself whether it is really safe, for it seems to be suspended in mid air above one's head with nothing apparent to sustain it, and this effect is not improved, though the monotony may be relieved, by panelling, coving, or any other device. Now, of all the portions of an apartment, the covering ought from its position, to have an effect of security, and that effect should be at a glance apparent; we should not have time to ask the question, before being satisfied on this point. Though people in general see nothing amiss with a flat clean white ceiling, this arises altogether from habit, and I am persuaded that were a person to accustom himself to compare ceilings as they are, with what they might be made, if the timbers above were shown and appropriately carved and decorated, he would very soon think as I do. Ceilings in churches are now happily going out of favour; but as to dwelling houses, I see no prospect of even a commencement of reform in this respect; and I dare say the very idea of exposing the floor joists to view will be absolutely ridiculed by many; nevertheless, I am quite satisfied that were we once to get over the novelty, the change would add greatly to the appearance of security and completeness in our apartments. I might add more on this head, but shall reserve further remarks to a future opportunity. I merely mention the practice now, as an example of the violation of the fundamental rule, that the construction of a building should not be concealed from view.

In treating of construction, I cannot omit saying a few words regarding the use of cast iron, which at the present day is so very extensively used in building. Had we gone on right principles, this material would very likely have modified considerably the character of our architecture, (for, in all ancient and independent styles, the nature of the materials employed has modified their character more than any other cause:) instead of which we keep on in the same track of columns, pilasters, architraves, &c., attempting to emulate and imitate the style of a distant age and country, with totally different wants and climate; while with a false shame we attempt to conceal our own real constructive resources; from which, under proper direction, we might rear a national style, in accordance with our national character and civilization. At the same time, I confess that the question, how far and in what manner cast iron may consistently be used in constructive architecture, is not easily solved. But we may safely lay it down as a rule, that its use must be in accordance with our fundamental rule of fitness and propriety: and therefore that it cannot properly be used where, if it is seen at all, it cannot assume the character and appearance belonging to the material itself. We frequently see portions of stone buildings which are most exposed to injury from being chipped and broken, as base courses, plinths, balustrades, &c.,[1] constructed of iron, and painted to resemble stone; under the false notion that the beauty of the parts will remain with, and depend upon, the sharpness of their preservation. Now, even supposing that the beauty of stone work did depend (which I by no means grant) on its perfect preservation, I contend that such contrivances are bad in principle, are never satisfactory even when quite new; and in a very short time the parts become so rubbed and polished, as to lose what little character of stone they at first possessed; and their very sharpness becomes a defect. I would far rather see genuine honest stone, even if it were a little chipped: indeed, I do not think a little damage of this sort here and there, in exposed situations where it is only to be expected, at all detracts from the beauty of stone work where there is any. To come at once to the point—I believe that for ordinary building purposes, in the styles usually adopted in this country, iron cannot be considered a proper material. We may perhaps, at some future time, have ingenuity enough to give it an appropriate and characteristic appearance, and then it may be properly brought into general use.

It must, however, be understood, that the above remarks do not apply to iron when used in fire-proof buildings. Here a new element is introduced, and the style and material have to be modified accordingly. Now, as in this class of buildings wood cannot be introduced, iron comes to our aid most opportunely, and may be used without reserve as a substitute for wood. It may indeed be considered a most valuable and indispensable material for such purposes. It should, however, in all cases assume a characteristic form. With the above important exception, the chief value of iron is in engineering and machinery, not in architecture.

We come now to the consideration of character, including form and enrichment. One of the chief causes of all the bad architecture of the present day, is a want of propriety and consistency between the outside and the inside of a building. The proper method of designing, and that which was followed by the architects of the middle ages, is, first to get a good and convenient plan, and on that to raise an exterior possessing the appropriate qualities of beauty or grandeur, most consistent with its purpose. Our system is, I might say almost universally, the direct contrary to this; we either design the exterior first, and adapt the plan to that, or we arrange the plan or interior with reference to some imagined exterior; and in either case we very often spoil both inside and out. We put up with inconvenience in the plan, for the sake of effect in the elevations; and we so study and constrain the latter, that, whether in a symmetrical style or not, they seldom possess the expected beauty or charm, even if they possess any beauty at all.

This is one of the evil consequences of copying the style of a distant age and country, and disregarding our own peculiar climate and manners, and the architecture which arose out of them. Our climate requires high-pitched roofs to throw off the water; we must have chimneys for the escape of smoke, numerous and spacious windows, variety in the parts and purposes of our buildings; all which are utterly at variance with the classical styles. On the other hand, we have no occasion for columns, entablatures, open porticos, and colonnades, which are absolutely necessary to the classical styles. Our requirements and wants are all internal; Grecian architecture is all external. Hence it follows, that classical architecture is not fitted for this country; and our surprise at its being so persisted in is the greater, from the numberless examples still remaining, of a style actually the birth and produce of our own soil. What can be more absurd, than building private mansions after the manner of Roman palaces, and Christian churches in the likeness of Greek temples. Some indeed seem to consider that we have at length had enough of such imitations, and to think that, for the sake of

[1] The whole surface of the ground floor of a pile of warehouses I have lately noticed to be faced with iron plates. If, in the construction of these warehouses, convenience, and convenience only, had been consulted, instead of grandeur of style, we should have had, instead of a mock imitation of a palace, a plain, honest, substantial, brick and stone warehouse, suited to its purpose, and telling its own tale. The doors and windows would have been in effect widened, by splaying their jambs, instead of being constructed and made perfectly square for the sake of effect; the sharp angle involving the supposed necessity of using a false material.

relief, we had better try what we can do with other styles; and we accordingly now import from Italy, Switzerland, Egypt; and we shall no doubt very soon have specimens after the Chinese fashion. But, as we cannot import with them the peculiar climates to which they belong, nor the peculiar manners which created them, we detach them from that which gives them character and meaning.

Even when the true national style is chosen, the application of it frequently betrays an utter ignorance of the rules of propriety. The many fine remains of castles and abbeys which adorn our land are no doubt worthy of admiration, but there is just as much propriety in imitating them in our modern dwelling houses, as there would be in a man going about in a monk's habit and cowl, or adopting the manners and defence of the twelfth century. A great deal might be said on this point, but I shall reserve further remark to a future occasion, when I hope to speak of architectural principles as applied to particular classes of buildings.

As regards enrichment, my limited space will not allow me to say so much as I could wish. The grand rule for its regulation, as laid down by Pugin, is, that "we should decorate our construction, instead of constructing our decoration." All the parts or features of a design should be useful first, and then ornamental or plain, as determined by propriety and consistency. No part should be constructed for the sole sake of ornament or effect, or which has not some significance. The essential parts of a fabric should be the only medium for rendering it beautiful. This rule exists, irrespective of any particular style: but in passing, I may mention that it is an additional argument in favour of our own national style. We too often loose sight of propriety and consistency in decoration, which is apt to be regulated more by consideration of expense than any thing else. The almost universal desire is "to have as ornamental a structure as the means will allow." This mania for indiscriminate ornament is chiefly owing to the facility enjoyed at the present day of obtaining it without limit by casting. In ninety-nine buildings out of a hundred, where there is any quantity of ornament, it is sure to consist of casts, either in metal, plaster, cement, artificial stone, compo, papier maché, &c.

In speculation houses, the ceilings and cornices are covered with ornament, (especially if the builder happen to be a plasterer, who has thus a fine opportunity of displaying his taste and his patterns,) and the same character of ornament, if not the same degree, is carried into halls, drawing-rooms, and bed-rooms, and thrust into all sorts of positions where it can be most seen. We see in cottages, and workhouses, grates and fenders literally covered with ornament, and rich enough for a gentleman's drawing-room. But, as it would not do for the same patterns to be used indiscriminately, in the houses of the rich and poor, numercus grotesque and meaningless forms have been devised to increase expense, and thus render the patterns fit for genteel residences. The same principles are acted upon in other materials, as cement capitals to stone columns, composition trusses supporting wooden friezes, all painted in imitation of stone. I do not mean to censure *in toto* the use of cast ornament; but what I insist on is, that it should be used consistently with propriety; and the tendency is, without great caution, to apply without discrimination, ornaments which in this manner can be obtained without a corresponding cost.

I think very false and pernicious notions regarding the value of ornament are commonly entertained. A great part of the charm of ornament consists in the importance it gives to the parts where it is used, and in the evidence it conveys of the high estimation in which such parts were held—of the taste, imagination, and love of beauty in the mind which produced it; and of similar qualities together with masterly execution, in the artificer. Now, when ornament is produced mechanically, and consists merely of plaster or cast iron, all the interest derived from this latter source is utterly lost. It ceases to be any criterion either of the liberality of the owner, or of the taste and talent of the artist. Besides, cast ornaments have never that freedom and boldness of relief which belongs to genuine carving.

In conclusion, while I urge the curtailment of the excessive use of decoration into which we are so apt to run, I would remark that if judiciously and consistently employed, its loss in quantity would be much more than counterbalanced by its gain in value and interest.

HENRY BOWMAN.

Manchester, May 1843.

THE DECORATIONS AT THE TRAVELLERS' CLUB.

(From the Athenæum.)

EXTENSIVE decorations, costing, it is said, some thousands of pounds, have recently been completed at this very happy adaptation of the Bufalini Palace. It is a satisfactory sign for the progress of art to find a growing attention paid to architectural decorations, and, in so far as those lately executed at the Travellers' Club are likely to promote that desirable result, we are disposed to welcome them; but, in proportion to their probable influence, it is the more necessary to protest against that absence of all principles, which is manifest throughout—on floors, on walls, on ceilings, in passages, and in rooms. Tasteless and chilling as may be the universal white paint of Queen Anne's days—of which the library at Blenheim affords a cool specimen—monotonous and depressing as are the drab and slate colours patronized by George IV., which abound in Windsor Castle, and are, unhappily, conspicuous in Buckingham House, (the pictures in the long gallery are hung against a drab-coloured wall,) it may be a question whether they are not preferable—exciting, as they do, no interest whatever—to bright colouring so misemployed that the eye cannot turn without detecting some false principle of taste.

The greatest offences in the decorations of the Travellers' Club arise from the employment of affectations and unrealities, which abound everywhere—sham granite walls, sham marbled columns and dados, sham bronze doors, sham bas-reliefs. As soon as you have passed the hall of entrance into the corridor, the fictions begin, and you traverse a passage of universal granites—pink, grey, green, &c. Besides being an affectation itself, this is the affectation of an unfit thing. Suppose the thing for an instant to be all real—would a *granite* passage be right in such a place? We are not entering an Egyptian temple, or the basement of a castle, but the light, cheerful passage of a sort of democratic modern palace, free from all fear of outward violence, and with a portal no more capable of resisting attack than polished mahogany and plate glass. Granite surely is not a material to be used here. But if you *will* use the hardest of stones for such a purpose, then ought not the forms in which you employ it to be somewhat analogous to the material itself? Here you have mock granite adapting itself to Italian mouldings—so light and elegant that you would select the softest oolite out of which to chisel them. The ceiling, too, is painted to affect granite. Do not all analogies drawn from nature, as well as all good architectural precedents, tell us that the upper part of a building should be in all respects of material, form, and colour, lighter than the lower part? Let us forget this affectation of a thing out of place, and look at this passage simply for its colouring, which indeed begets the first general impression. Banish from recollection that the colouring is grained, and look at it as a surface of pink and grey—which is its aspect to most eyes. It may be a right principle to keep the passages and halls duly subordinate to the rooms, in respect of their decorative characteristics, but surely a passage that faces the *north* needs to be a little warmer and more cheerful in colouring than one which looks south. Yet here, in a due north aspect, we have shades of cool colours. The materials employed in the building of this hall, and its ornamental parts, are chiefly wood and plaster, made to be coloured. Would not correct taste, then, simply colour them, producing the best effects out of the unlimited range of colours?

The wainscot staircase of the club remains substantially as it was before these recent decorations. Being chiefly of oak, its very reality protected it from change. The ceiling here has been richly painted in various bright colours, displayed in arabesque forms and panels, generally resembling those we also find in the drawing-room—for which very reason we think that these decorations cannot be altogether consistent—certainly they do not accord with the oak stairs and banisters. The walls here, as in the upper corridor, have been divided into panels by arabesque borders and lines. The effect is light and tasteful; but the carpet, which is a mass of unbroken crimson, is much too full-toned and positive to accord well with the delicate pale hues of the walls. The figures in the arabesque painting do not rise beyond second-rate decorative art, and the human figures which are sometimes introduced, are by no means well drawn or well proportioned. The highest academical excellence in drawing ought not perhaps to be demanded under such circumstances, but in this case, as it was thought necessary to send out of England for a decorative painter, we might fairly have anticipated something better than what we could have produced ourselves. In the present case, the work—both in design and execution—is certainly not beyond the mark of many of the London decorative painters. If our school of design has produced any fruits at all, it must by this time have educated a score of pupils quite up to the standard of these decorations.

Through a mock bronze door—of which a few words presently—we enter the drawing-rooms. What is the first general impression, without examining the details? The tone of the colouring is neither warm nor cold—though parts are of both characters, and there is no lack of many varieties of colour. The aspect of the room is a north one, and being such, the prevailing arrangement of colour should be warm. Modify it as you please to suit the particular character of the apartment—but do not forget that the room receives hardly a ray of direct sunshine throughout the year. In these drawing rooms the greater part of the surface of the walls is of a pale, cool-looking colour, something between a lemon and a cream colour, arranged in panels, which are bordered by strong and rather dark contrasts. The lower part of walls, the dado, and its mouldings, are coloured imitations of marbles, in which a bluish green predominates. Then the doors and window shutters are coloured dark green, to imitate bronze—a violent contrast to the walls—and made the more positive by the deep crimsoned draperies of the curtains. The ceiling is richly coloured and gilt, whilst the walls are comparatively plain. The character of both ought surely to be more consonant—or, if there were any difference, ought not the more attractive features to be on the walls, where they are most easily seen? Look from the ceiling to the carpet, and in the latter there is the same absence of concordance and propriety. It has no leading key-note of colour—so to speak—but is a sort of helter-skelter of many colours. These rooms cannot be said to have any general effect, or any one strong point to which all others are subordinate. There is nothing positive—nothing consistent—one part is warm, another cold. Richness in the ceilings, poverty on the walls;—deep-toned colours brought into violent contrasts with others of a very low tone. As for harmony and due subordination of parts one with another, they cannot be met with. The whole gives an impression as if it had been the work of a committee, where there had been a compromise to suit every one's taste, and each member had undertaken the independent arrangement of different parts—one superintending the floor, another the ceiling, a third the walls, a fourth the doors and shutters, a fifth the draperies, and so on. Having looked at the rooms thus generally, we proceed to glance at some of the details, which, in their want of principle, deserve severer criticism.

The ornaments are inconsistent with each other. Some are early Grecian, some Pompeian, some of the age of Louis Quatorze! as in the cornices of the window curtains. There is no objection perhaps to a combination of different styles—but it can only be realized successfully by a principle which, depriving each of its distinctive and independent character, succeeds in making all integral and harmonious parts of a novel creation. In architectural forms Palladio and Wren succeeded in accomplishing this, when they took those of ancient Rome and adapted them to the buildings of modern Europe. But the decorations at the Travellers' Club are very wide of the application of such a principle. Each different part—said cornices especially—looks like an independent impertinence, and to have been brought together by chance or caprice. It has been noticed that the doors and window-shutters are painted in imitation of bronze, of a dark-bluish bottle-green hue. The same question suggests itself here as below in the granite corridor. What want could there be even for real bronze under such circumstances? The doors are subjected to no violences; not even exposed to corrosion in the open air. At best, they are unsightly mockeries. On the panels of the doors are painted imitations of bas-relief metal work. Imitations are tolerable in proportion to their successful approximation to realities. When it was decided so to ornament these panels, the use of real metal, iron, if bronze was too costly, would not have been an impossibility: A few shillings' worth of Mr. Bielefeld's *papier maché* ornaments would at least have given an actually raised surface, and insured natural shadows whenever the door was opened. Now under fixed painted shadows, every time the door is opened a positive untruth is told in the face of the light. What can be said of the drawing-room carpet?—a thing in which the cost of pattern is hardly a consideration: certainly not to such a club as this. It is just the carpet you would chance to find adorning the drawing-room of a flourishing cheesemonger in Aldgate or the Minories: flowers of every hue displayed in shaded golden scrolls. It belongs to no recognized style, ancient or modern; even that lowest of styles, the Louis Quatorze, would not own it. Is it not a mistake to attempt any imitations which cannot succeed? If we want the representations of flowers, let them be executed by means which insure something like a correct representation. Employ colours and brushes in the production of pictures of them if you will, but surely not worsted threads. The Greeks took the beautiful forms of nature and used them not as affectations to recall feebly the remembrance of the originals, but adapted them in new methods to new purposes—which suggested new views of their intrinsic beauty. Even the artists of the middle ages exercised a better taste than ourselves. A bunch of flowers or group of animals worked in worsted, with its angular shapes affecting to imitate the flowing lines of nature's original, with its crude colouring and hard-marked blotches meant for brilliant hues and soft graduated shadows, merely reminds you how signally it is unlike what it has copied. How different is the effect produced by the pattern of the Grecian honeysuckle or the acanthus leaf on the Corinthian capital! We look on both as works intrinsically beautiful in themselves, as new creations and not as imitations. The Arabs have taught us how we may have a beautiful arrangement of colours almost independent of pattern. But we do not now intend to write an essay on carpets; and we can only dispatch that of the Travellers' drawing-room by saying that it has both pattern and abundance of colours—but combined on such false principles that the meanest of Grecian ornaments or Arab combinations of colours rise very far above it.

We have thought it worth while to enter somewhat at length into this matter, because the members of the Travellers' Club belong to a class who will probably exercise some influence in those decorations of our national buildings which seem to be likely to be realized at no distant day. Should the parties who are responsible for the taste of the decorations in this club, have any voice in directing those of the Palace of Westminster, we hope our remarks may induce them to reflect that there are principles in such matters, which cannot be neglected. If it be true that some thousands of pounds have been spent on these works, we do not scruple to say that a more satisfactory result might have been produced at a much less cost, had a more correct knowledge of the principles of decoration been applied.

ON SIMPLICITY OF COMPOSITION, ESPECIALLY IN CHURCHES OF THE EARLY-ENGLISH STYLE.

(From the Ecclesiologist.)

One very striking difference between ancient and modern compositions in this style is the characteristic ambition of the latter to attain *effect*, by the introduction of a great deal of showy detail, in positions where it is neither required by use, nor sanctioned by the principles of true architectural propriety, so far as the general practice of antiquity be admitted as the test of correctness in these points. We do not mean that superabundant ornament, properly so called, is the common fault of modern churches, but that genuineness is too often sacrificed for show, and that shallow and poverty-stricken designs are meretriciously tricked out as if for the mere purpose of deception, with inappropriate because unnecessary embellishment, while the really essential elements of strength, utility, and reality, which alone constitute true beauty, are either unaccountably overlooked, or knowingly neglected as matters of secondary importance. For instance, how frequently do we see a thin shell, though internally destitute of piers and arches (features absolutely essential in churches of a certain size), disguised and set off by a ridiculous display of pinnacles, turrets, ornamental parapets, and crocketed canopies, where not one of these would have been thought of by an ancient architect in building a church of the same size and with the same means. He would have disdained to give affected elegance to his bold and low massive walls, his stately roof, and his fearless irregularity of buttress, windows, and gable: much less would he have used cast iron props for piers, that he might have more money to spend in making a fine street elevation.

The fact is that a certain amount of external decoration, or rather *showiness*, is erroneously considered requisite for the correctness of a church, merely because it is necessary to ensure a competition design being chosen. Now it is very important to observe how completely the ancients were influenced by the *contrary* principle. There is an honesty in their designs which is very striking, if we contrast it with the spurious architectural pretension of many modern churches; and we speak more especially with reference to those generally erected three or four years ago, though specimens of this sort are unfortunately common enough at the present day. They never made their walls a foot thinner, or their buttresses a foot shallower, or their roofs lower and less substantial, than they ought to be, that they might expend a larger sum upon a fine doorway, or a superfluous arcade, or a richly decorated front. With them all was real, genuine, and natural. No one part was extravagantly adorned to the disparagement of the rest; if one feature was costly, all was in accordance, and not one half starved that the other might be pampered. In a word, nothing was attempted that could not be well and consistently carried out.

Again, as to the kind of ornament now generally used, much grave objection is to be raised. There is, so to speak, a certain quantity of generally recognised Early-English detail, culled from every possible source, the mighty cathedral, the costly abbey, the larger parochial churches, as well as from books, foreign and English, and the traditional kinds of ornament used, perhaps with no authority at all, by modern builders, all of which is thrown into a common stock, to be freely and indiscriminately applied to any building, without regard to its size, character, situation, or conditions of structure. A few points we will proceed to specify, in which, according to the extent of our own observation, modern designs are not consistent with ancient models.

1. We scarcely ever see a modern early-English church, however small its size and otherwise humble its pretensions, without showy octagonal pinnacles, having heavy cappings and angular shafts around the stem. This feature would almost seem to be considered an absolutely necessary characteristic of a church of this style, and accordingly it is repeated over and over again till the eye is quite wearied of it. Yet who ever saw the like in a real early-English church of the same size? These are essentially cathedral features, and even there are scarcely found, unless of actual use in balancing a vault.

2. Flying buttresses, and buttresses in general, are, we think, greatly misapplied. We scarcely ever see a modern early English buttress without pedimental head and set-off, though these are in fact comparatively rare in ordinary churches of the thirteenth century. A cathedral or a great monastic church will have, of course, much rich and costly adornment in every part; it will have, therefore, elaborate buttresses with lofty triangular heads rising above the parapet for the springing of the flying buttresses which span the ailes and support the clerestory; but where are these found in smaller churches? Here we seldom observe any but bold and plain supports, for use and not for show, and therefore placed exactly where and as they are wanted, and not at all unless they are really wanted, without the least affectation of ornament or regularity, in short without a particle of trickery about them. Examine, for instance, the plain specimens at Barnwell, Cherry-Hinton, or Histon, and imagine what the effect would be were they exchanged for the trim and chamfered, but meagre and regular, buttresses of the modern architect.

3. Gable ornaments. We really have seen very few modern designs without every gable being pierced with a vesica piscis, a foliated triangle, a circle, or some fantastic little window. Architects, until the last year or two, so seldom thought of a good high-pitched roof, that they now seem frightened at their own gables, and very often greatly injure their effect by inserting these unnecessary and not always even appropriate ornaments. We

are satisfied that they are of comparatively rare occurrence in ancient parish churches, and that properly speaking they are adapted only for very large and rich edifices. An example, indeed, occurs in the chancel at Trumpington; and in churches of this date circular gable lights sometimes may be found; we think, more frequently than in early-English.

4. Of western doors and western triplets we need in this place say nothing, having endeavoured in a former number to prove them inadmissible in small churches. In general, we greatly object to the common practice of coupling or tripling lancets in every position, and not less so to making them of the very exaggerated size and disproportionate breadth we frequently find in them. The disposition and just dimensions of lancets in general is a subject requiring the greatest judgment and nicety, and is therefore deserving of the most earnest attention, since there is no detail so generally misused as this. We have constantly seen small modern churches lighted by lancets almost large enough for a cathedral, and admitting as much glare as perpendicular windows. We may instance the new churches of St. Michael at Stamford, and St. Andrew at Northampton. What a contrast do such buildings as these present to the sombre and subdued light which was eminently characteristic of all early-English churches!

5. Apses. We have often had occasion to remark upon the impropriety of these in any but Norman parochial churches, and even here we by no means recommend their adoption. We believe that no instance of an early-English apse in a small church occurs in England. Certainly, if any can be found, they are but exceptions. Yet our modern architects generally terminate their churches eastward by a semi-octagonal or a semi-circular apse, perhaps only ten or twelve feet deep. This is a cheap and in some respects showy substitute for a full chancel; but it is not an English feature, nor is it by any means either a becoming or appropriate one, since it is in fact a mere altar recess, and in nine cases out of ten is without an entrance arch. Moreover, as the right position of the altar in an apse is upon the chord of the arc and not against the east wall, the altar is either so placed as to violate the original meaning and use of the apse, or brought prominently forward almost into the nave.

6. Parapets and gable-ends. The first are not necessary in small churches. The eave-roofs of most ancient examples, we think, fell simply and unaffectedly upon the bare walls; whereas an ornamental parapet, with a cornice of notch-heads, or dog-tooth, or corbels, is now usually considered indispensable. We recently inspected a design for the restoration of an early-English church in Lincolnshire, where very insufficient funds were obtained even for absolutely necessary repairs; yet among the "essentials" a "moulded parapet to the chancel," though it did not appear ever to have had one, was prominently set forth. There is no need to be ashamed of a great roof, or to attempt any disguise or superfluous decorative concealment. A parapet will often, by its over-neatness and appearance of affected finish, detract from the bold and picturesque simplicity of a small church. And the lower the roof, the more objectionable a parapet becomes. Modern gables too are generally awkwardly terminated at the eaves by heavy shoulders or prominent saddle-stones, or look somehow as if the architect did not know exactly what to do with them; whereas what he ought to have done with them was simply to let them alone. The ancients seem seldom to have cared much about them, but to have let them fall easily away with a notch-head, or a bead, or a chamfer; or at most with gablets, as at Stapleford; but always plainly, and therefore gracefully and appropriately. The complex gable arrangements we have seen in numerous modern designs are strikingly contrasted with these.

Nothing, in fine, is left to itself; nothing is plain, unpretending, simple, irregular, accidental. Every detail is overdone; we must have nothing but triplets, and arcades, and wheel-windows, and trefoiled ornaments; and we must always improve our towers and east and west elevations by pinnacles and flying buttresses. Thus much is affected, but nothing attained; parts are strained and exaggerated, but general effect is rather injured than improved. For what constitutes effect as applied to ecclesiastical architecture? Appropriateness, solidity, grandeur, honesty, chasteness, boldness; not unnecessary and meretricious ornament, but the position of a feature just where it is wanted and as it is wanted, without disguise, without hesitation. It is not the insertion of a north window merely because there is a south one exactly opposite; not the making one side exactly of the same size and shape as the other; not having buttresses, windows, and doors of precisely the same height and breadth and design in every part of the fabric. Such were certainly not the principles which guided our forefathers in the erection of their churches, and we must endeavour to enter fully into their principles of composition and distribution before we can hope to produce the same effect merely by the use of the same kind of details; a truth which has indeed often been urged, but still has not met with due attention.

It must, nevertheless, be observed that there is a wide and important difference between plainness and meagreness in church architecture. The former is simply the absence of ornamental detail, the latter is a scanty and stinted development of the essential parts of construction. A building may be plain, and yet perfectly graceful and pleasing; but if it be also meagre, it necessarily becomes ugly; as all who have seen Christ church, St. Paul's, and St. Andrew's, in this town, will readily acknowledge. For in the one case we perceive at once that all, as far as it goes, is genuine and complete, and therefore pleasing and satisfactory to the eye. In the other, the affectation without the attainment of the primary characteristics of ancient models implies deception; we desiderate that reality which could alone ensure successful imitation. Costliness and ornament should be regarded only as a step in advance of plainness and simplicity. The same elements of beauty are contained in both, but in one only is it developed. The absurdity, therefore, of ornamental meagreness instead of simple massiveness is evident, since decoration was never intended as a substitute for, but only as an addition to, solid and substantial construction. Yet upon this false principle modern churches are almost without exception erected.

We have ventured to offer the above remarks chiefly, as will be readily understood, in reference to designing small early-English churches, from a conviction that architects are often content rather to copy one another and the depraved fashion of the day, than uniformly to make antiquity alone the test of correctness in their compositions. By neglecting to do this, they have imperceptibly contracted a formality and a mannerism which is very detrimental to the revival of the art, and which nothing but a close adherence to ancient models is likely to remedy. Modern early-English, instead of being identical or at least closely allied with the style of the thirteenth century, is quite a distinct and isolated production, which in future ages will be regarded in the same light as we now regard the debased perpendicular, namely, an attempt to imitate its forms without a knowledge of its principles.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

INSTITUTION OF CIVIL ENGINEERS.

April 4.—WILLIAM CUBITT, V.P., in the Chair.

"On the Supply of Water to the City of Glasgow." By D. Mackain, M. Inst. C. E.

This paper contains a history of the progressive increase of the water-works of Glasgow, caused by the rapid extension of the city and its manufactories, derived from the documents in the archives of the Water Company, to which the author is the engineer. The statement commences from the year 1755, at which time Mr. John Gibson, in his History of the City of Glasgow, expressed a desire for several improvements, among which he particularly mentioned a better supply of water, as although the population amounted to 23,000 persons, the water used by the inhabitants was drawn from the Clyde, from the several streams running through or skirting the city, and from wells in the streets; the water from the latter was unfit for domestic purposes, and the manufactories gradually extending on the sides of the burns polluted their waters, and thus rendered a better general supply absolutely necessary. The various plans proposed in the year 1780 and subsequently are then detailed, and as an instance of the low estimate then formed of the quantity of water required for a community amounting to about 43,000 persons, it is stated that the produce of a spring at Whitehill, which it was then proposed to convey to the city for its entire supply, is now found inadequate for the wants of a house of refuge for juvenile delinquents lately erected near it. In describing the project of Mr. Henry Bell for bringing water by a canal from the Falls of the Clyde, his reasons are given for rejecting the use of steam-engines. "These engines," he says, "are not only in themselves objectionable, in so far as they will be hurtful to the value of surrounding property, and a general nuisance to that part of the city or neighbourhood where they are erected: but the consumption of coals which will thereby be occasioned will tend in no small degree to heighten the price of that fuel." An account is given of the speculation of Mr. Harley, who erected pumps at Willow Bank, and forced the water through pipes into a reservoir in Upper Nile Street, whence it was carted through the town, its sale producing a revenue of about £4000 per annum.

At length a water company was formed, and Mr. Telford was requested to report upon the proposed plans, all of which he found objectionable, and recommended that steam-engines should be placed on the banks of the Clyde, at a spot about two miles up the river, with the necessary reservoirs, filters, &c., and that the water should be forced by pumps into the city. He estimated that the quantity of water required for a population of 80,000 persons would be about 500 gallons per minute; that, including manufactories, the renters would be about equal to 6000 families; and that the average rent upon that number would be 2*l.* per family, which would produce £12,000 per annum. Acting upon this report, in the year 1806 the company ordered from Messrs. Boulton & Watt two engines with cylinders of 36 in. diameter, and laid pipes of 14 in. diameter to a reservoir on the spot, then called the Gallow Muir; from this small commencement sprung the present extensive works, whose gradual increase is carefully traced in the paper until the enumeration of its actual position in 1842, when the population of the city exceeded 300,000 persons, and the annual income was about £30,500, making the average payment about nine shillings per annum for each family. The works had increased until they consisted of thirteen steam-engines, of various powers, with their filters, reservoirs, &c., an accurate account of which is promised in a future communication. In this history many statistical details are given, obtained from the archives of the company; and the difficulties encountered by the engineers who preceded the author in the management of the works, are clearly described.

The details of the various oppositions from local interests, the several Acts of Parliament, the fluctuation of the mercantile value of the shares, the history of the Cranston Hill Water-works, formed by a rival company, with whom for a time a ruinous competition existed, and whose works it became necessary to purchase, are given at length. The paper then describes the natural filter for the water, which was taken advantage of, by driving tunnels along the borders of the peninsula round which the Clyde sweeps in the form of a horse-shoe. This spot being composed of sand and gravel would, it was argued, form a filter, whence the water could be pumped up and conveyed across the river into the city. Many plans were designed for thus carrying the water; that which was adopted was suggested by Mr. Watt: he proposed the use of cast iron pipes, fitted, where necessary, with revolving ball and socket joints, which he then first introduced, and of which he sent a wooden model to the company, which model was now presented by them to the Institution of Civil Engineers. These pipes adapted themselves to the form of the bed of the river, and the plan was perfectly successful.

Mr. Telford's experiments upon stone pipes are mentioned, and some results are given. A stone from Rutherglen White quarry, 4 ft. 9 in. long, $18\frac{1}{2}$ in. square, with a bore in it $9\frac{1}{2}$ in. diameter, when subjected to a pressure of a column of water from 60 to 80 ft. in height, split in the direction of the natural bed. Another stone from the same quarry, 5 ft. 2 in. long, 13 in. square, with a bore of $4\frac{1}{2}$ in. diameter in it, did not emit any water until the pressure amounted to 100 ft. head; after that it discharged water freely, and split when the column a little exceeded 300 feet. A Portland stone, 4 ft. 6 in. long, 12 in. diameter, with a bore of 6 in. diameter in it, did not emit any water, nor was there any symptom of fracture under a pressure of 350 feet. Other stone pipes were also experimented upon with such various results, that Mr. Telford arrived at the conclusion, that they could not be relied upon, and accordingly recommended iron pipes.

The paper is illustrated by a large map of the city of Glasgow, upon which is shown, by different tints, the houses which existed when the water-works were commenced, the ranges of distribution, and the extent of the district for which the company is bound by Act of Parliament to supply water for certain periods during each day.

Remarks.—Mr. Simpson said that he was well acquainted with the works which had been described, as he had repeatedly visited them professionally; there were many points of interest attached to them, and the engineering operations were of considerable magnitude and importance. The late Mr. Watt suggested the idea of using the sandy peninsula on the opposite side of the river Clyde to the present works of the Glasgow company at Dalmarnock, as a natural filter, and it succeeded admirably, until the immoderate quantity of water was delivered to the city during the competition with the Cranston Hill Water Company. Of this spot, and the tunnels and wells in it, he presented a tracing. When he was at the works in the year 1833, Mr. Alexander Anderson, the then resident engineer, had been pumping water on to the peninsula for many months, and the deficiency of the natural filters, (nearly half the supply at the time) was made up by that means; at first the pumps were worked by rocking shafts connected to the engines across the river; afterwards pumps were erected close to the engines, and the water conveyed across the river through pipes. A very large portion of the supply to the inhabitants was drawn from the mains, without the intervention of cisterns, and a great deal of the water was thus wasted. The filter recommended by Mr. Telford was composed of a series of cells filled with sand, the water passing through them in succession; this filter was not effective during floods or when the water of the Clyde held in suspension the colouring matter from the peat-mosses; after passing through the first cell little more was accomplished, and the water continued discoloured.

Mr. Simpson had, however, seen the Clyde water filtered until it was perfectly bright, by conducting the process very slowly, the rate of motion not exceeding half an inch per hour through the medium—precipitation on the sand evidently took place; he had in some instances accelerated the precipitation by previous admixture of alumina or pipeclay and other materials, and had succeeded in throwing down the colouring matter, so that the filters produced perfectly pellucid water. In a filtering bed, properly arranged, the impurities were arrested at and near the planes of ingress—great extents of medium effected little in addition. In some filters which had been worked for nearly sixteen years, it had not been found necessary during that period to change the entire mass of materials. The natural filters of the Glasgow company had been injuriously affected by depressing the water in the wells, thereby increasing the pressure of the water on the bed and the foreshores of the river, and thus bringing the particles of the medium into too close contact and forcing obstructions between them. The Glasgow Water-works was an example of the employment of the largest steam-engine power for water-works purposes in Britain; he believed that at one period the engines at the works were equal to nearly 700 H.P. During the erection, in 1829, of the second pair of engines, with cylinders of 54 inches diameter, many difficulties were encountered; in the Vale of the Clyde, large quantities of mud almost in a fluid state lie intermixed with the strata. In sinking the wells for these engines, the mud was met with much nearer the surface than was anticipated, and when tapped, it rose up like a fountain in the bottom of the well; the pumps were, in consequence, fixed at a higher level than was originally designed. Mr. Crichton, of Soho, was of opinion that the alteration of 4 ft. 5 in. in the level of the pumps was immaterial; he probably did not calculate upon the water sinking in the filter-wells when the increased pumping power was applied.

Mr. John Gibb, of Aberdeen, who was consulted about the foundation, bored to 30 feet lower than the bottom of the new well, and found that the ground became weaker as the depth increased, so that any attempt to sink the well to the depth required would be very hazardous. He therefore advised the enlargement of the surface of the building under the whole superstructure, with due provision for the weights and strains in the arrangements; that a strong platform should be constructed of Memel logs and planking for the foundation, and the spaces between the timber to be filled in with masonry flushed in and grouted; this plan was adopted, and proved successful as a foundation, but the depth was insufficient, and the working barrels of the pumps were obliged to be fixed so much above the level of the filters, that they ceased to fill when the water in the tunnels was depressed 22 feet below the tops of the pumps. This was a serious disappointment to the company, for whenever the water in the river was low, a corresponding depression occurred in the wells of the filters; and in general, for many hours daily, these two engines only raised as much water as one would have pumped, if the working barrels had been fixed at the proper level. The suction-pipes were inclined towards the filter wells, and the pumps were distant from them about 110 yards; this, Mr. Simpson considered, was comparatively of little importance, as he had worked pumps with horizontal suction pipes 500 yards in length.

Mr. Hawkins recommended slow filtering, without pressure; some years since he had been engaged in refining sugar by Howard's process, by which the syrup was applied to the filter under a column of 20 feet in height; out of a certain quantity, 300 gallons were returned unfiltered, and by the time 60 gallons had been clarified, the filter was choked. He reduced the column to 2 feet, and out of the same quantity 6 gallons alone were returned, while 300 gallons were clearly filtered; this, and numerous other cases, had convinced him that pressure was injurious to filtration.

Mr. Braithwaite believed, that although slow filtration was generally preferable, yet that the velocity must depend upon the quality as well as the quantity of matter held in suspension; this consideration would also regulate the time during which the filter could be worked without cleansing.

Mr. Hawkins found practically, that half an inch in depth was the utmost that was required to be removed from the surface of the filtering medium when it was cleaned and renewed.

Mr. Simpson said, that in order to filter properly, there should be extensive reservoirs where all the grosser particles could subside or be arrested previously to arriving at the filtering medium; with due attention to this point he had seen filtering-beds worked for 67 days consecutively without requiring to be cleansed.

Appendix to the last Paper.

"*Description of a cast iron Reservoir erected at Garnet Hill, by the Glasgow Water-works Company.*" By D. Mackain, M. Inst. C.E.

A considerable extension of the city of Glasgow is now taking place to the north-west of the old town upon an elevation of upwards of 100 feet above the river; the water-works, which are situated to the east of the city, are already upwards of 4 miles distant from the extreme point of delivery, which is almost daily becoming more remote, and the cost of the supply of water is consequently increased. These circumstances rendered necessary the establishment of a new reservoir, which should be sufficiently high and capacious to command and to supply the district. The ground which was obtained for this purpose was on the declivity of Garnet Hill, and had a fall of 20 feet in 90 feet extent. It was necessary to keep the bottom up as high as possible and yet not to contract the space by thick walls, and to erect such a building as should not be offensive to the neighbourhood; these considerations induced the author to recommend the use of iron plates for the reservoir, which should be masked by a screen of masonry designed by Mr. James Smith, architect of Glasgow.

The construction is thus described. A bearing wall of 4 ft. 6 in. in thickness was carried up from the foundation all round to within 1 foot of the floor of the reservoir. A division wall was built across the centre to carry the partition for dividing the reservoir into two parts. The space within these walls was filled in with broken stones, over which was a layer of clay, and then a layer of sand, upon which was placed a flooring of Arbroath pavement well jointed with cement, and resting at the sides upon the flanches of the sole plates, which were bedded in a mixture of lime and Roman cement, in such proportions as afforded ample time for the adjustment to be completed. The lower tier of plates was 1 inch, and the upper tier $\frac{11}{16}$ inch in thickness. Their flanch joints were made secure by inserting between the faces a lead pipe $\frac{5}{8}$ inch diameter, filled with lint-gasket soaked in red lead and tallow, in addition to which the whole was caulked with a composition of hot lime and linseed oil, which in a short time became very hard. The reservoir is 123 ft. long by 85 ft. 6 in. wide, and 13 ft. 2 in. in depth; it is entirely covered by a malleable iron roof supported upon cast iron pillars.

The paper is illustrated by two drawings and four lithographs, giving the dimensions of every part of the work, and by a specification of the mode of execution.

Remarks.—Mr. Simpson said that he had examined the reservoir very carefully, and could bear testimony of the excellent manner in which the work was done. The mode of construction was novel, and had succeeded perfectly, as no leakage had occurred since its erection, nor had any inconvenience arisen from the variations of temperature, or from the unequal depths of water in the two compartments. He thought Mr. Mackain was entitled to much credit.

Coradino Tank at Malta.

A drawing of the Coradino Tank, erected in 1841-2, in the island of Malta, was presented by William Lamb Arrowsmith, Assoc. C.E. (Superintendent of Government Works at Malta).

It was described as the largest modern covered tank in Europe, its cubic contents being 700,000 feet, and with its settling reservoir it would contain 15,000 tons of water; the roof was supported by rows of square pillars 15 ft. in height. It was intended to form a part of the works for supplying the island with water, a description of which was promised to the Institution to complete the paper on the supplies of water for cities, the first part of which has already been received.

ARTESIAN WELLS.

A letter was read from the late Sir John Robison, giving a short account of the *Artesian Well at the Abbatoire de Grenelle, Paris.*

The Abbatoire being at too high a level to obtain an adequate supply of water by the ordinary means, it was proposed, about eight years since, to sink an artesian well within the premises, which proposal having been agreed to, the execution of it was intrusted to Monsieur Mulot. The work having been perseveringly carried forward through many difficulties, the boring was terminated by the auger penetrating the water-bearing strata on the 26th February, 1841, when a sudden and violent rush of water occurred, overflowing at the surface of the ground. As the boring progressed, tubes of rolled iron, and subsequently of copper, were inserted to support the sides, the first being $12\frac{1}{4}$ inches diameter, and the lowest about $6\frac{1}{2}$ inches diameter, reaching to a depth of $1794\frac{1}{2}$ English feet. The quantity of water thrown up while the bore remained in this state was about 880,000 imperial gallons per day, at a temperature of $82\frac{1}{2}°$ Fahrenheit; the expense incurred up to this time being upwards of £12,000 sterling. Sir John examined the theoretical reasons which had been given for the contortion of the tubes, which had been attributed to violent pulsations in the flowing water acting upon the outside of them, crushing them inwards; he objected to this reasoning as not being in accordance with the laws of hydrostatic pressure, and attributing it rather to mechanical causes arising from the force used in forcing the tubes down the hole, and even more to the violence they were subjected to in being withdrawn from it.

The letter was illustrated by a lithographic section of the well, which was presented by William Cubitt, Assoc. C.E.

Remarks.—Mr. Cubitt had recently visited the well, and found the water flowing with considerable force through an orifice in the vertical pipe about 8 feet beneath the level of the ground; the nozzle of the orifice, which was 10 inches diameter, was about half filled, and the stream was reported to be supplying about 2500 litres (550 gallons) per minute, at a temperature of 82° Fah. The water was not clear; it deposited a considerable quantity of fine sand, and occasionally stones of about 2 inches cube were brought up. He was informed that the water had at one period ascended to between 70 and 90 feet higher than the ground.

Mr. Taylor observed, that the temperature of the water nearly coincided with that of the United Mines in Cornwall, which were 295 fathoms, or 1770 feet deep. The highest temperature recorded there was, he believed, 96° Fah. It was well ascertained now, by the experiments of Mr. Fox, that the heat was not increased either by the decomposition of the pyrites, or the number of men and horses employed in the mines.

Mr. Enys said, that the experiments by Mr. Fox, as published in the report of the seventh meeting of the British Association (vol. vi, p. 133) gave a temperature of 92° in the lode at a depth of 290 fathoms, where it was first reached in the cross-cut; but on proceeding along the same cross-cut, at 10 fathoms from the lode, the temperature decreased to 86° 3′, and at 24 fathoms distant it was 85° 3′; this would give a close approximation to the temperature quoted by Mr. Cubitt.

Mr. Braithwaite inquired at what depth the temperature began to increase; landsprings were generally at about 52°, and he found the water in wells 600 feet deep usually at 53° or 54°. He had understood that the temperature increased 1° for every 65 feet, after a certain depth.

Mr. Enys said, that Mr. Fox's experiments gave a ratio of increase of 1° of temperature in 48 feet, calculated from the surface. He thought that the close approximation of the temperature of the land-springs, and that in the wells mentioned by Mr. Braithwaite, might be accounted for by the rapidity with which the water filtered through the strata of the London basin.

Mr. Taylor agreed that the heat of the water was influenced by the nature of the strata; the Cornish miners, when they were taken to the North Welsh mines, were much inconvenienced by the coldness of the water in the latter, although the depth of the mines in both districts was nearly identical.

Mr. Braithwaite believed that his view of the temperature of wells would be corroborated by the coldness of the water in the new well at Southampton, which had now arrived at a very considerable depth, and he understood that the temperature of the water was about 54°.

Mr. Simpson said, that the well at Southampton had been sunk and bored to the depth of 1063 feet; the supply of water was not considerable, and he was not aware that any observations had been made as to the temperature. A well at Chichester had now arrived at the depth of 1013 feet, and was still being carried lower.

Mr. Sopwith contended for the accuracy of the investigations of Count Brenner on the temperature of two German mines, and of Messrs. Fox, Buddle, and others in England; the differences between the results obtained were so trifling as to induce confidence in the conclusion they had arrived at, which was, that after allowing for the radiation of heat at a certain distance from the surface, the temperature increased 1° for every 50 feet in depth. This law might not hold good in certain local basins, where from the nature of the strata the percolation of surface water was rapid, but in the extensive mining districts it certainly was correct.

Mr. Cubitt suggested that the close approximation of the temperature of the water in the well at Paris and that observed by Mr. Fox at the same depth in Cornwall, might arise in some measure from the large volume of water in the former, and the rapidity with which it arrived at the surface: whereas in the deep wells which had been mentioned, the water had probably been allowed to cool before the temperature had been ascertained.

Mr. Clarke corroborated the opinion entertained by Mr. Cubitt; in a well which he had sunk to the depth of 540 feet at St. Alban's, he obtained, by an apparatus constructed for the purpose, some water from the bottom of the well, and found it 4° hotter than that which was pumped up from the same well. At the bottom of a well at Messrs. Barclay's brewery, 367 feet deep, the water was 3° hotter than at the water-level in the same well. Local causes frequently affected the temperature of water in wells; he had seen instances of the water being warmer at 60 and 70 feet deep than at 300 feet, but these cases would not influence the general law.

Mr. Vignoles considered the facts mentioned by Mr. Clarke to be very valuable, and as bearing out Mr. Cubitt's idea; there could be little doubt that if, by means of self-registering thermometers, the temperature of the water was ascertained, at the issue of the springs, at the bottom of deep wells which were not influenced by local causes, the result would prove in accordance with the observations of Fox and others. By the laws of the circulation of fluids the heavier water, which had been cooled at the surface, mingled with the lighter and warmer water as it rose; the sides of the well also tended to abstract the heat; therefore the temperature should be obtained at the greatest depth in order to make any correct experiment.

Mr. Braithwaite agreed in the influence of local circumstances; in a well at Cheshunt, at a depth of 40 feet, a sulphureous spring issued, the vapour of which almost killed the workmen: and when at last it was built out, the bricks continued so hot that the hand could scarcely be borne against them. Below that point very cold water was met with.

April 11.—JOSHUA FIELD, V.P., in the Chair.

THE WATER-PRESSURE ENGINE AT FREYBURG, SAXONY.

Description. By William Lewis Baker, Grad. Inst. C.E.

The machine described in this communication was designed by Herrn Brendel in 1823, and constructed in 1824, for draining the "Alte Mördgrube" mine, one of the largest silver mines in the neighbourhood of Freyberg, in Saxony. This engine, which is fixed at a depth of 360 feet below the surface of the ground, has two single-acting cast iron cylinders, each 18 inches in diameter, and 9 feet stroke, to the pistons of which are fixed strong timber piston rods, each attached at their upper ends by a flat iron rod and chain, to the opposite segments of a horizontal working beam, thus connecting the pistons of the two cylinders, so that, when one is being moved upwards by the pressure of water underneath it, the other is depressed by the weight of all the pump-rods and other moving parts to which it is connected. The admission and eduction of water from the cylinders is regulated by slide valves worked by levers and tappets. The piston-rods give motion to the horizontal arms of two bell-crank levers, the diagonal arms of which move the main pump-rods, working 44 pumps in two sets of 22 each placed one above another, at an angle of 45° with the horizon, each dipping into the delivery cistern of the pump immediately below it; this is repeated downwards for the whole series; and thus the water is raised from the bottom of the mine to the point where it runs off by an adit. Each pump has a lift of 30 ft. 4 in. The duty performed by this engine is stated by Gerstner[1] to be as 70 to 100.

The author then gives a very minute account of the construction of the engine, illustrating the paper by three drawings giving the general arrangement and the detailed dimensions of all the working parts.

Remarks.—Mr. Taylor remarked that the water-pressure engine was of Hungarian origin; it was extensively used in Germany, and had latterly been much improved in construction, particularly by abandoning the rude mode of placing a series of pumps over each other, as had been described in the paper. He believed that Smeaton erected the first engine of the kind in this country. Trevithick built one about 40 years since, with cylinders of 30 in. diameter. Another was erected by Mr. Fairbairn, and since then, one had

[1] Gerstner, "Handbuck der Mechanick," published at Vienna in 1834.

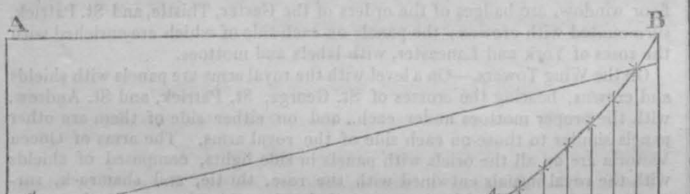
been built, under the direction of Mr. Darlington, with cylinders of 50 inches diameter, and 10 feet stroke, worked by a force of water of 22 fathoms, through a descending column of 30 inches diameter; the pumps worked by the engine were 42 inches in diameter, raising water from a depth of 22 fathoms; the usual speed of working was four strokes per minute, but he had seen it attain six strokes. The concussion produced by the closing of the valve at the end of the stroke, was generally very prejudicial to these engines; but in that made by Mr. Darlington, it was diminished by allowing the large valve to close a short time before the stroke finished, and bringing the piston home with a small valve; by this means no noise was heard beyond that of the rush of the water, and the violent shocks were avoided.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Thirteenth Meeting, 1843.—*Held at Cork.*

"*On the Application of our Knowledge of the Laws of Sound to the Construction of Buildings.*" By Mr. Scott Russell.

The object of this paper was twofold—first, to apply our knowledge of the known laws of sound to the phenomena of speaking and hearing in a given building; and secondly, to develop certain laws of sound recently discovered, and not generally known; and to show their application to the same practical purposes. Part I. of the paper contained the application of the known laws of sound to the construction of buildings. The author prefaced this part of the paper by describing a form of building which had been found to be perfectly adapted to the purpose of seeing and hearing with distinctness and comfort. This arrangement of buildings had been described by him in a paper communicated to the Royal Society of Arts of Scotland some years ago, but had not been actually constructed on a large scale until lately, when a young architect, Mr. Cousins, of Edinburgh, having been employed to construct some large buildings, and alighting on this paper, adopted its principles. Buildings were now erected on this principle, and contained from fifteen hundred to three thousand people, whom they accommodated without difficulty, and with perfect comfort both to speaker and hearer. He had little doubt, from experiments he had recently made, that so many as ten thousand people might be so arranged as to hear with ease and comfort a good speaker. Mr. Scott Russell's principle of construction is to place the speaker in the focus of a curve, which he calls the curve of equal hearing, or the isacoustic curve; and to place the seats of the auditors in such a manner that their heads shall all be arranged in this curve.



"Let A B C D represent the vertical section of a building for public speaking, S the height of the speaker on his platform, D C the floor of the building; then, for the purpose that all the auditors should hear and see equally well, they should be placed on the line S R B of the acoustic curve. This curve is constructed in the following manner:—D C is first divided into equal parts to represent the usual breadth of a sitting, and vertical lines are drawn through these points. R being the place of the auditor 1, the place of auditor 2 behind him is assigned thus—join S R, and produce it to *a*—from *a* upwards set off *a* 2 = 9 inches, and 2 is the proper height of the next spectator. Then join S 2, produce it to *b*, and set off *b* 3 = 9 inches, and 3 is the place of the third spectator, and so on for the place of every spectator. Such was the vertical section of the building. The horizontal section was either circular or polygonal, having the speaker at the centre. This form had been found perfectly successful in affording the highest degree of comfort both to hearer and speaker; therefore he submitted it with confidence to the section, as a practical and established principle, more than as a mere theoretical speculation. The remainder of this paper was then adjourned till the next day.

"*Chromatype, a new Photographic Process.*" By Mr. R. Hunt.

We are indebted to Mr. M. Ponton for the discovery of the first photographic process in which chromic acid was the active agent. He used a paper saturated with the bichromate of potash, which, on exposure to sunshine, speedily passed from a fine yellow colour into a dull brown, giving, consequently, a negative picture. E. Becquerel improved upon this process, by sizing the paper with starch previously to the application of the bichromate of potash, which enabled him to convert the negative picture into a positive one by the use of a solution of iodine, which combined with the starch in those parts on which the light had not acted, or acted but slightly, forming the blue iodide of starch. These pictures are, however, tediously produced; they are seldom clear and distinct, and failure too frequently follows the utmost care. While the author was pursuing an extensive series of researches on the influence of the solar rays on the salts of different metals, he was led to the discovery of a process by which positive photographs are very easily produced. Several of the chromates may be used in this process; but the author prefers those of mercury or copper, the most certain effects being produced by the chromate of copper, and, indeed, in a much shorter time than with any of the other chromates. The papers are thus prepared; good writing paper is washed over with a solution of the sulphate of copper and partially dried; it is then washed with a solution of the bichromate of potash and dried at a little distance from the fire. Papers thus prepared may be kept for any length of time, and are always ready for use. They are not sufficiently sensitive for use in the camera obscura, but they are available for every other purpose. An engraving—botanical specimens or the like—being placed upon the paper in a proper photographic copying frame, it is exposed to sunshine for a time, varying with the intensity of light from five to fifteen or twenty minutes. The result is generally a negative picture. This picture is now washed over with a solution of nitrate of silver, which immediately produces a very beautiful deep orange picture upon a light dun colour, or sometimes perfectly white ground. This picture is quickly fixed by being washed in pure water and dried. The author remarked that, if saturated solutions were used, a negative picture was first produced, but if the solutions were diluted with three or four times their bulk of water, the first action of the sun's rays was to darken the paper, immediately upon which a very rapid bleaching action followed, giving an exceedingly faint positive picture, which was brought out in great delicacy by the nitrate of silver. It is necessary that pure water should be used for the fixing, as the presence of any muriate damages the picture, and hence arises another pleasing variation of the chromatype. If the positive picture be placed in a very weak solution of common salt, the images slowly fade out, leaving a very faint negative outline. If it be taken from the solution of salt and dried, a positive picture of a lilac colour may be produced by a few minutes' exposure to sunshine. Prismatic analysis has shown that the changes are produced by a class of rays which lie between the least refrangible blue, and the extreme limits of the violet rays of the visible prismatic spectrum—the maximum darkening effect being produced by the mean blue ray, whilst the bleaching effect appears to be produced with the greatest energy by the least refrangible violet rays.

"*On the Construction of Luntley's Shadowless Gas-burners, and the Shape of Glass Chimneys for Lamps.*" By Mr. H. Dircks.

The object of the burner was to bring the gas issuing from the small orifices into direct contact with atmospheric air at the ordinary temperature. Mr. Dircks contended that the heating of the air previously to its combustion diminishes the brightness of the flame; because, while each volume of carburetted hydrogen gas requires ten volumes of atmospheric air for its perfect combustion, the expansion of the air by heat necessarily reduces the weight of oxygen contained in the same volume of air; and therefore unless some means be adopted of increasing the supply of air, the oxygen would be deficient. Another alleged advantage of the burner arises from the small quantity of metal through which the orifices are perforated, for by that means a smaller quantity of heat is abstracted in burning. The peculiarity in the form of the glass chimney consists in having the upper end enlarged. The effect of this enlargment, Mr. Dircks said, was to open the top of the flame and increase its brightness.

Mr. J. Taylor explained to the meeting the recent improvements of Dr. Faraday in the combustion of gas; and a short discussion arose, in which Mr. Hawkins and Dr. Scoresby took part, on the advantage of enlarging the upper ends, not only of glass chimneys, but of all chimneys for the combustion of fuel."

Tidal Observations.

Mr. J. S. Russell read a report of his observations on the tides of the Frith of Forth and the east coast of Scotland. The especial object of this series of investigations was to discover fully the nature and causes of some remarkable tides which exist in the Frith of Forth, and to connect them with observations on the adjacent tides, and likewise furnish some better data for the construction of practical tide tables for predicting the time and height of high water at these places. The methods of observation were distinct from those which had previously been made. Instead of merely observing the periods of high and low water, observers were placed to note the rising of the water every five minutes, night and day, for several weeks and months together. This was done at twelve places simultaneously, from Newcastle along the coast to Inverness, so that from 2,000 to 3,000 observations were got from the stations in the course of a day. These were daily transmitted to the central station, and immediately laid down geometrically on ruled paper, so as to represent graphically to the eye the outline of each tidal wave by a curve. From the form of the curve it was that the most important results were to be obtained, although the undertaking was laborious. The results of the observations were most important and satisfactory. Two distinct set off tide waves visit together the east coast of Scotland, but one of them has hitherto been much neglected. One goes round the north of Scotland and runs south; a second comes northward from the Straits of Dover. These were demonstrated on two charts; the progress of these was exhibited. Their presence was seen in the whole Frith of Forth down to the open sea; but in the upper part of the Channel these double tides were thereby distributed, and rendered more visible. These tides had opposite inequalities which indicated their age and origin. The paper was of very considerable interest, and it was stated by Mr. Russell that the Ordnance survey had just been conducting a series of similar observations in Ireland.

Mr. Hopkins read a paper "*On the Motion of Glaciers.*" Glaciers are formed on inclined planes by the gradual fall of water, which is converted into ice. As the ice increases it gradually expands, but in the first instance the motion is scarcely visible. He said he had made several experiments to illustrate this subject. An inclined plane was erected, on which he placed a box of ice, which he then elevated to an angle of 3 degrees; the motion was at the rate of 7 inches per day; on being raised to 6 degrees, the motion increased to 12½ inches; at 9 degrees it increased to 23½ inches; and at 12 degrees to 48 inches, increasing in a very large proportion afterwards. He then endeavoured to ascertain the least inclination at which the ice would move, and found that it would proceed down an inclination of half a degree.

OBITUARY.

MR. JAMES HAKEWELL.

Died at his apartments in Adam Street West, Bryanstone Square, May 28 1843, in the sixty-fifth year of his age, James Hakewell, architect. This gentleman was principally known by publications on architectural antiquities and the fine arts. His fi st work was a novel, entitled "Cœlebs suited; or, the Stanley Letters," 1812. In 1813 he produced a large volume in imperial 4to. called "The History of Windsor and its Neighbourhood," with twenty-one engravings and fourteen vignettes from his own drawings, price five guineas. The views were from his own pencil. It was well received at the time, and many years after he was much gratified on receiving the thanks of Sir Jeffry Wyatville for the publication, coupled with the assurance that, in his alterations in that abode of royalty, he had endeavoured to carry out his suggestions. When the general peace opened the Continent to English travellers, he went to Italy, accompanied by his wife, whose taste and talents qualified her thoroughly to enjoy all the beauties of nature and art that were displayed before them, and there they passed the greater part of the years 1816 and 1817, which afforded the materials for a "Picturesque Tour of Italy," which was published, with sixty-three plates, in twelve parts quarto and folio, 1818-1820, illustrated by parallels of Dorton House, Hatfield, Longleat, and Wollaton, in England; and the Pallazo Della Cancellaria, at Rome. This is an interesting work, both in its literary matter and in illustrations. Among the latter are some engravings from fine drawings by Turner, one of which, a composition of Roman edifices, surpasses any picture by Pannini. This work was brought out with great care, and immediately obtained a high rank in the estimation of the public, which it is well qualified to retain, as, for accuracy of delineation, and excellence of engraving, it does not yield to any that sprung from that fruitful field. In 1825 he published, in folio, "A Picturesque Tour in the Island of Jamaica, from drawings made in the years 1820 and 1821." In 1828, "Plans, Sections, and Elevations of the Abattoirs of Paris, with consideration for their adoption in London," 4to. In 1835, "An Attempt to determine the exact Character of Elizabethan Architecture," 8vo. In the year 1840 he was engaged in furnishing drawings for a projected work on the Rhine, which it was intended should have been a counterpart to his "Italy," but which has never been published, the drawings remaining in the hands of the engraver. *Gentleman's Mag.*

THE NEW HOUSES OF PARLIAMENT.

THE interest which this extensive undertaking has excited in this country and on the continent, has rendered any information upon its present state and condition, and upon the progress that is now being made towards its completion, a matter of some value. A correspondent of the *Times* has furnished the following details, by which it will be seen that the undertaking is proceeding in a satisfactory manner.

Without going into the general plan of the work, which is, perhaps, more easily gathered from the descriptive plates, which are to be found in every shop window, delineating the figure and outline as also the ground plan of the building itself, it will be necessary only to call public attention to such parts of the works as are actually finished, or which are in course of progression at the present moment. In the first place, looking at the river front, the divisions of which it is composed (commencing from Westminster-bridge) will be found in the following state :—

The North Return, or Serjeant-at-Arms' Residence.—The greater portion of the parapet is completed and ready for the roof, which is now preparing, and which will be of cast iron, covered with Westmoreland slates. The present height from the ground level is about 70 feet.

The North Wing and Towers, or Speaker's House—which are intended to be about 140 feet high, are proceeding rapidly, their present height being about 66 feet above the ground level.

The North Curtain, or Libraries and Committee-rooms of the House of Commons, are advanced to about the same height as the north return.

The centre portion, which will comprise the conference-hall, the public waiting-hall, the upper waiting-hall, the staircase and various large committee rooms, is fast proceeding, its present level being about 66 feet above the ground, but it will be eventually carried up considerably above the curtain portions, thus forming beautiful and effective towers over the peers' and commons' entrances to the terrace. The carving upon this part of the work will be of the most elaborate character.

The South Curtain oı Peers' Libraries and Committee Rooms, are at present about the same height as the north return.

The South Wing and Towers, or Black Rod's and the Librarian's of the House of Lords residences, stand about 63 feet above the ground level, and will be precisely the same as the north wing.

The South Return, or the Lord High Chamberlain's apartments, are also about 63 feet above the ground level.

The exterior ornamental work and carving upon those parts of the building just described are perfectly astonishing, both from their extent, their minuteness, and the enormous amount of human labour lavished upon them. No description, however, will give more than a faint idea of the exceeding beauty and elaborateness of this part of the work.

Extending throughout the whole length of the river front or principal elevation, may be observed a band over the principal floor windows, containing a series in bold relief of the arms of the sovereigns of this country, commencing with William the Conqueror and terminating with those of her present Majesty. In the early arms, where there were no supporters (that is to say, from William I to Richard II), figures in the appropriate costume of the time have been introduced to fill up the spaces, and at the same time to illustrate some principal event in each reign. On each side of the royal arms are panels composed of sceptres and ribands, with mottoes and foliage peculiar to each house. Underneath the windows is a narrow band, with inscriptions in the style of black letter, bearing each king's name, when he began to reign and when he died, with its initials on each of the buttresses.

The principal cornice is enriched with figures of grotesque animals over small shafts, and the intermediate spaces are filled in with pateræ composed of heads, badges, and foliage, whilst over the whole of this there runs an enriched parapet having niches containing angels holding shields, with initials, &c. In the centre portion above the cornice, and over the two-pair floor window, are badges of the orders of the Garter, Thistle, and St. Patrick, surmounted with crowns; the panels on each side of which are enriched with the roses of York and Lancaster, with labels and mottoes.

On the Wing Towers.—On a level with the royal arms are panels with shields and crowns, bearing the crosses of St. George, St. Patrick, and St. Andrew, with the proper mottoes under each, and on either side of them are other panels similar to those on each side of the royal arms. The arms of Queen Victoria are on all the oriels with panels in side lights, composed of shields with the royal initials entwined with the rose, thistle, and shamrock, surmounted alternately with the crests of the three kingdoms. On the return of the wing towers in the same level are panels with the badges of the three kingdoms, with angels bearing swords of state, &c., and the four patron saints in four tiers of niches. Between these and in a band over the one-pair floor windows are their arms arranged separately, with roses and crowns in the intermediate spaces, and the different badges used by each separate house from the Conqueror to the present time. On the return of the river front, or principal elevation, we see on a level with the royal arms devices of the different sovereigns from the time of the Heptarchy to the death of Harold, both included, divided between the buttresses by four tiers of niches, with statues of each king together with their queens; underneath which, on a level with the same, is a small band containing inscriptions of a similar character to those on the river front, divided with shields and ribands, the shield bearing a monogram of "Anglia," and surmounted with a crown. The cornice is similar to that in the river front. In the parapets are niches over the statues, containing lions, holding shields, bearing initials, &c.

It is necessary to be particular in describing the various ornaments introduced on the external parts of the work already finished, not merely to show the wonderful labour, talent, and richness lavished upon the outside of the building—for, be it remembered, that these ornaments are neither of composition or of plaster, but hewn out of the solid stone—but also as an act of justice to a very young but deserving artist (Mr. Thomas), from whose design (subject to the approval of the architect) the whole of these wonderfully elaborate ornaments have been executed.

The general effect of this part of the work is exceedingly imposing, and in point of beauty and minuteness, is equal to that of any other Gothic structure in this or any other country. Amongst the other parts of this wonderful building is the Victoria tower, which is now progressing rapidly, and which is at present about 10 ft. above the ground. Much expense has been incurred, and great labour required to obtain a proper foundation for this portion of the work, owing to the quicksands and land springs which were found under it, but which have been entirely cleared out to a depth of 24 feet from the surface, to a good gravel bottom, which being surrounded with large elm piles driven down into the clay, metallic concrete, 10 feet 7 inches thick, was thrown in, and a good firm bottom obtained.

In addition and adjoining to this are the Guard-rooms and Sub-hall under the Royal gallery, which are about eight feet above the ground level.

The Sub-hall under the House of Peers is carried up nearly to the principal floor level, as are the central tower and adjoining buildings.

The Sub-hall under the House of Commons is about six feet above the ground level, as are the Commons' residencies, comprising those for the chief clerk of the House and the librarian.

The clock tower at the north-west angle of the building has the foundation and groining to the vaults completed.

As regards the internal decoration of those parts already finished, it will be remarked that the only parts completed are—the Public Hall, with its chimney-piece, with bold jambs enriched with the several orders of knighthood, with their appropriate mottoes, foliage, &c., and having over the chimney-piece niches containing the lion and the unicorn separately holding shields. Over each entrance are the present Royal arms, the supporters holding banners with their respective cognizances. The spandrils and enriched mouldings are filled in with national devices, mottoes, and foliage.

In the Central Lobby attached to the Public Hall over the side entrances, are the Royal arms, with helmet and crest. On the sides of the doors are badges of the three kingdoms in high relief, surmounted with crowns, whilst underneath the windows are panels with sceptres, swords of state, and ribands, forming a proper device, and filled in with the national foliage. On the staircase, leading out of the Public Hall are windows with elaborate tracery, with a border of quarter foils, filled in with pateræ, continued down with a series of shields.

These, it would appear, are the only parts which are finished in the interior up to the present time, but still even in this short summary enough is shown to display the magnificent style and character in which it is intended to carry out the plan of the New Houses of Parliament.

In addition to those parts of the building which came under the observation of our correspondent, the most striking object was a pattern of the ceiling, which it is proposed to place in the two halls, which Peers and Commons are actually to occupy. These ceilings are to be of wood, and are to be formed in 18 compartments, divided by spandrils springing from corbels; each of these compartments are about seven feet square, and have upon their face a plain, but exquisitely beautiful, raised pattern, traced from the design of Mr. T. Dighton, the artist. It is understood, also, that these ceilings are to be in colours, and when completed, we have no doubt, they will be magnificent. Taken altogether, the works would appear to be proceeding satisfactorily. Our correspondent states that about 600 persons are employed actively upon them; and it is hoped that the part intended for the House of Lords will be ready for use in about a couple of years.

When finished, there can be no question that there will be nothing in Europe superior to them, either as regards the taste and magnificence exhibited in the design, the magnitude of the building itself, or the exquisite workmanship apparent in every part of it.

RAILWAY CHRONICLE OF THE MONTH.

Greenwich Railway.—The half-yearly meeting of the Greenwich company was held on Tuesday the 1st. The report showed a falling off in the traffic, as compared with the corresponding period of 1842, of 119,000 passengers and £2327. There was no dividend for the original shareholders, who feeling that the course which had been pursued under their sanction, had been wholly unsuccessful, carried the appointment of a committee of inquiry to consider what means there were of arranging with the other companies as to the toll to be paid over the Greenwich line, what alterations were necessary in the fares, and to investigate into the whole management of the concern *ab initio*. It is to be observed, that the existing board came in under a committee of inquiry some years ago. On the 15th, the meeting was again held by adjournment, when a report only as to the fares was given, recommending reduced fares of 8*d*., 6*d*., and 4*d*., return tickets of 1*s*. and 10*d*. for the 1st and 2nd classes, and annual subscriptions of 12 guineas and 10 guineas for the first and second classes. Another adjourned meeting was held on the 24th, when it was resolved to accept the mileage principle, but with a guarantee that it should not fall below a certain amount, £13,000 being the amount contended for by the Greenwich.

Grand Junction Railway.—The meeting of the company was on the 3rd; the chief features of interest are a decrease on the receipts of £22,542 11*s*. 11*d*., and in the expenditure of £13,653, on the corresponding half year of 1842. Dividend at the rate of 10 per cent per annum. No allowance made this half year for the depreciation fund.

The Manchester and Bolton Railway Company report that they have agreed conjointly with the Lancaster Railway proprietors to supply locomotive power to the Bolton and Preston Railway company. They have also commenced an improvement of the canal navigation, which will render it capable of admitting vessels of 68 feet in length, 14 feet 2 inches in width, and drawing 4 feet 6 inches water, boats hitherto being restricted to about 3 feet draught of water. This is to improve the coal traffic. They state that the colonnade, forming part of the connecting line with the Liverpool and Manchester and Manchester and Leeds at Manchester, is nearly completed, little remaining to be done but to lay the rails. The dividend was 1*l*. 7*s*. 6*d*. per share.

The North Union Railway Company recommends a decrease of dividend, and state the diminution of passenger receipts at £2000.

The Chester and Birkenhead Railway Company mention a decrease of 3979 passengers and 552*l*. and in the expenditure of £3240. The arrangements for the tunnel from the Birkenhead station to Monk's Ferry are mentioned as in progress. The dividend was 7*s*. 3*d*. on the original shares of 50*l*. A resolution was carried in favour of low fares.

The York and North Midland Railway meeting was held on the 4th, and a decrease was stated in the passenger receipts of £2200, an increase in goods of £2682, and a reduction in the expenses of £1000. The dividend recommended was 2*l*. 10*s*. per share, taking a small sum from the reserved fund. The Directors recommend the prosecution of a branch from York to Scarborough to join the Whitby and Pickering Railway.

The Leeds and Selby Railway is leased to the York and North Midland. The dividend declared was 2*l*. 10*s*. per share.

The Brighton Railway meeting was held on the 8th. A new board having been appointed, the report was principally directed to the arrangement of the accounts, which were in a defective state. It stated that eight contracts remained unsettled. A new wharf is mentioned as having been completed at Shoreham, for the reception of steam vessels of the largest class, which cross the channel from England to France; and also for the loading and unloading of trading vessels of greater burden, three of which can be accommodated at one time. An opinion was expressed favourable to an amalgamation of the locomotive power with the South Eastern and Croydon Companies. No dividend was declared, as the Directors had charged the interest account up to the date of making up the books, which had not previously been done.

The North Midland Railway meeting was on the 9th. A diminution had been effected in the working expenses of £11,530. A branch to Bradford was recommended to be prosecuted, and resolutions in favour of an amalgamation with the Midland Counties and Birmingham and Derby Companies. A dividend was recommended of 1*l*. 10*s*. per share.

We must observe that with nearly every Company a reduction or prospective reduction of the rate of interest on loans was reported.

The Northern and Eastern Railway meeting was on the 10th. The report states that Mr. Robert Stephenson has been engaged as engineer to the company; that a contract had been made with Messrs. Grissell and Peto for the entire construction of the Hertford and Ware branch, for £67,000, half to be taken in shares at par; and that the opening was expected in October. The Newport extension was to be begun on the removal of the crops. An extension to Cambridge was urged as necessary, and steps will be taken. The dividend was 12*s*. 6*d*. per share. A proposal from the Eastern Counties Railway Company for an amalgamation, not being adequate, had not been accepted.

The London and Birmingham Railway Company's meeting was on the 11th at Birmingham. It was stated that the decrease in the passenger receipts had been £13,113, increase on goods £10,019, and reduction in charges o £20,430. Dividend recommended at the rate of 10 per cent per annum. The works of the Warwick and Leamington Railway are stated to be let on satisfactory conditions.

The Midland Counties Railway meeting was held on the 10th. The Directors report the continuance of a contest with the Birmingham and Derby company about the traffic. The dividend recommended was 1*l*. 4*s*. per share. A resolution was passed appointing a deputation to confer with the Midland and Birmingham and Derby Railway Companies, as to the Chester amalgamation.

The Great North of England Railway meeting was held on the 8th. There was an increase of merchandise traffic of £754. The dividend recommended was at the rate of 2½ per cent per annum.

The Newcastle and Darlington Railway Company's meeting was held on the 4th. It stated that £135,000 had been expended, that the works were progressing, that the line would be opened on the 1st of July in next year, and completed 20 per cent below the engineer's estimate. A negociation for the purchase of the West Durham Railway was authorized.

The Sheffield and Rotheram Railway Company's meeting was held on the 12th. A falling off in the revenue of £900 was reported, and a saving of £900, principally in coke, by working the locomotives in conjunction with those of the North Midland Railway Company. Dividend recommended at 5 per cent per annum. Some altercation took place at the meeting as to the Committee of the Company having forced the Company to take some carriage wheels, which were not wanted. The prospect of a junction with the Sheffield and Manchester Company was stated not to be immediate.

The Bolton and Preston Railway Company's report was that they had opened the line to the junction on the 22nd of June, and that the contractors' accounts had been closed. The Directors recommend a double line of rails to be laid throughout the line. They report that they had leased their locomotive power of the Manchester and Bolton Railway Company, and Lancaster Railway Company. A kind of competition was going on with the North Union Railway Company.

The Great Western Railway Company's meeting was on the 17th at Bristol. The dividend was a reduced one of 5 per cent per annum. The passenger receipts had slightly diminished, and goods increased. The general expenses had been diminished £5359. The buildings at the Bristol station, for the merchandise department, and at Swinden for the engine department, were represented as completed. The reconstruction of the permanent way between London and Maidenhead is recommended, the timber being of too light a scantling to be traversed by heavy engines at a high rate of speed. The conclusion of the arrangements for the completion of the Cheltenham and Great Western Union line is reported. The arrangements for the joint working of the Bristol and Glo'ster line are mentioned. The Oxford Railway is reported to be laid out, a contract taken for its completion in eight months; and it is to be laid with a double line of rails. A promise of cooperation with the Devon and Cornwall Railway Company is given.

A company has been brought forward called the *Eastern Union Railway Company*, for the purpose of extending the Eastern Counties by two short branches, one to Bury St. Edmunds, of 13 miles in length, and one to Harwich of 5½ miles in length; and also to embank about 2000 acres in the river Stour. The main line is proposed to proceed from Colchester by way of Maningtree, Holbrook, Ipswich, Needham Market, Starmarket, Cotton, Diss, Eye, Scole, and Long Stratton to Norwich. The gradients are represented as favourable, maximum 1 in 132, earthwork very light, no lofty embankments, deep cuttings, or extensive viaducts. Cost estimated at £16,000 per mile.

The Devon and Cornwall Railway Company has received the promise of support from the Bristol and Exeter Railway Company, Bristol and Glo'ster Railway Company, and Great Western Railway Company. A large sum has been subscribed in Cornwall, Lady Bassett having subscribed for £5000, and given the land for two miles in length, Mr. Pendarves, M.P., having subscribed for £5000, and Lord Wodehouse and others having taken shares for their land.

It will be perceived that among other new lines in progress are those from York to Scarborough, and from Newport to Cambridge, and a branch to Harrowgate.

The Blackwall Railway meeting was held on the 22nd. A deficiency in the revenue account was reported, so as to make it inadequate to meet the expenses; the number of passengers had, however, nearly reached the former number. A change was made in the Board—the chairman (Mr. Routh) and half of the Board going out—the remaining five directors and five new members constituting the new Board.

The South-Eastern Railway.—At a special meeting of the shareholders on Friday, July 21, the Directors obtained power to raise loans for the following works. For the extension of the line from Corbett's Lane to the Bricklayer's Arms, a distance of about two miles, and forming a station at the latter place, £177,777; this sum does not include the whole cost of the branch: a portion of the expense is to be raised by the Croydon Railway. For the formation of a branch railway to Maidstone, a distance of 10 miles, £149,300, to be constructed under the superintendence of Mr. Robert Stephenson, and finished within 12 months after obtaining possession of the land. —For the formation of a branch railway to Folkestone Harbour, and for the purchase and formation of the harbour, £266,600; the sum of £18,000 is the amount agreed to be paid for the purchase of the harbour: it comprises an area of 10 or 12 acres. Mr. Cubitt, the engineer, stated that the largest vessel that can now enter the harbour is 300 tons burthen, that is 250 register. The largest which it will be able to accommodate will be 300 tons, and the number of small and large vessels about 80 to 100. A pier is to be constructed 500 feet long, and which will be carried out 200 feet in 10 or 12 feet water.

The London and Croydon Railway.—At a special meeting of the shareholders on 25th July, the Directors obtained power to raise £70,000 for the formation of the branch from near New Cross to the Bricklayers' Arms, being for £60,000, one third the proposed cost; the other two thirds to be raised by the South-Eastern; and £10,000 for reconstructing a portion of the present line to unite it with the proposed branch. It is expected the branch will be finished by next spring.

Eastern Counties Railway.—The meeting of this company was held on the 24th. The report states that most of the contracts have been closed, and that new contracts have been entered into to fill up with soil the Mountnessing and Shenfield timber viaducts, which it is expected will be effected in six weeks. Orders have also been given to fill up the Lexden timber framing. It is stated that this is not done from any apprehension as to the safety of the viaducts, on the part of the Directors, but on the part of the public. Not the least settlement is, it is said, perceptible. The Directors express their satisfaction with the progress of the traffic, and declared their intentions of again prosecuting the application for the branch from Stratford to the Thames. They also ask power to negociate with other Companies for the formation of extension lines. They express themselves favourable to leasing the Northern and Eastern. A dividend was declared of 5*s*. on the new shares and 4*s*. on the old shares.

Bristol and Exeter Railway.—This meeting was held on the 23rd. The report states the probability of an earlier opening to Exeter than had been before promised, so as to open the line throughout on the 1st of July, 1844, viz., a year before the period anticipated. The dividend was 1*l*. 8*s*. per share. With regard to the proposed Devon and Cornwall Railway, the plan of assistance is stated. The Bristol and Exeter to contribute £200,000. of the proposed capital, the Great Western £150,000, and the Bristol and Gloucester £50,000, the rest of the capital, £800,000, to be raised from the public. The tunnel on the Bristol and Exeter is the chief work remaining uncompleted. With regard to this some delay had taken place, from the failure of a contractor; but additional shafts have been commenced, and everything done to expedite the work. About one-third of the whole length is excavated, and the work is proceeding at 22 different faces, and will be in a short time at 28 if required. The stations are to be let in a few days.

Birmingham and Gloster Railway.—The meeting of this Company was held on the 25th. It intimated a slight increase in the receipts, and a diminution in the expenditure to the extent of £2,363. The dividend declared was 12*s*. per share. One chief feature in the proceedings was a long discussion as to the disposition of the Great Western Railway to lease the line, and as to the mode in which the negotiations had been and were to be conducted. Another feature was the defeat of the Board in the election of Directors. The four vacancies were filled up by the opposition, who carried the day with a large majority, by means of the use of stamped proxies.

Bristol and Glo'ster Railway.—This meeting was held on the 24th. The report states that the branch at Bristol to join the Great Western has been contracted for. It is 1,100 yards in length, and will be completed in four months. It states too that no arrangement has been made with the Great Western as to the working of the line.

Birmingham and Derby Railway.—This meeting was held on the 25th, when a dividend of 5*s*. per share was declared. As the question of amalgation with the North Midland is to come before a special meeting, no feature of interest transpired.

UNION OF RAILWAY.—The *Derby Reporter* states that " the committees appointed by the shareholders of the Midland Counties and North Midland Railways have met and agreed upon the terms for amalgamating the three lines, the North Nidland committee having had authority to negotiate for the Birmingham and Derby Railway. The terms, we understand. are, that the shares of the North Midland and Midland Counties' Companies are to rank equal, but the 100*l.* shares of the Birmingham and Derby are to receive 27*s.* 6*d.* per annum less dividend—other shares in proportion. It now only remains for the shareholders to assent, for which purpose special meetings will be held as soon as the forms will admit."

TABULAR STATEMENT FOR THE HALF YEAR, DECEMBER 31, 1842, TO JUNE 30, 1843.

RAILWAYS.	....		....	RECEIPTS.			PAYMENTS.							....
Names.	Lgth in mls.	Total Expenditure.	No. of Passgrs.	Passgrs.	Goods.	Total.	Locomotive Power.	Carriages.	Maintenance of way and Reprs.	Office Department.	Taxes and Rates.	Total Charges.	Interest.	Profit.
		£		£	£	£	£	£	£	£	£	£	£	£
Greenwich [1]	3¾	1,030,108	705,204	21,343	..	26,587	3,500	3,490	1,044	1,551	3,304	13,957	11,550	1,080
Grand Junction [2]	88¾	2,375,134	..	132,976	49,652	185,093	20,298	29,692	12,675	4,591	2,954	80,320	..	104,772
Manchester and Bolton ..	10	777,956	139,408	11,571	6,293	17,811	1,095	3,110	732	754	268	5,959	5,282	9,008
North Union	22	613,212	..	17,731	6,793	25,337	1,466	2,142	1,471	1,236	1,082	7,397	3,249	14,690
Chester and Birkenhead ..	14½	509,810	..	11,491	1,298	13,307	2,110	2,382	1,089	237	172	5,990	2,525	2,837
Leeds and Selby [3]	20	..	99,782	3,756	8,158	11,914	..	1,251	567	444	477	2,739	..	9,175
Brighton [4]	56	2,792,193	..	65,487	9,002	74,490	9,168	18,150	4,980	3,417	3,003	49,827	43,974	..
North Midland	72¾	3,424,766	..	56,551	46,263	102,814	10,267	13,922	9,012	1,400	2,659	36,760	21,200	44,854
Northern and Eastern Counties [5]	32¼	887,055	..	31,853	3,693	35,547	6,702	6,945	2,033	..	895	20,324	5,695	10,875
London and Birmingham [6] ..	112½	5,953,831	..	306,457	84,735	389,658	32,854	41,141	22,451	5,645	8,747	112,238	39,680	223,924
Midland Counties	57	1,725,693	..	40,421	21,064	62,324	10,780	9,498	7,105	3,383	1,378	32,144	12,813	17,367
Great North of England ..	74	1,230,604	64,177	19,754	13,225	32,979	2,830	3,497	3,700	1,844	1,184	12,355	14,202	7,000
Sheffield and Rotherham [7] ..	5¼	..	185,234	7,040	953	8,116	..	2,107	486	371	420	3,384	1,199	3,578
Bolton and Preston	14½	373,925	..	3,846	1,468	5,315	2,000	1,170	185	..	92	3,447	..	1,867
Great Western [8] .. .. -	118¼	6,651,928	725,127	254,603	75,400	330,003	33,403	54,640	23,985	4,118	8,592	159,232	86,836	82,886
Liverpool and Manchester ..	51	1,578,601	225,728	60,752	48,217	108,960	10,182	27,698	4,440	2,193	3,608	48,121	3,777	57,062
Blackwall	3¾	1,289,080	..	17,351	927	18,505	..	..	600	..	1,498	15,385	5,553	..
Eastern Counties	50¼	2,718,620	999,683	..		43,182	4,551	3,741	2,552	1,284	1,520	20,355	2,116	20,710
Birmingham and Glo'ster ..	55	1,470,730	..	35,514	7,104	42,618	7,968	6,956	6,444	1,290	382	26,045	13,633	4,266
York and North Midland ..	27	673,056	165,627	26,369	13,388	45,163	5,846	5,145	1,177	462	974	13,604	3,958	27,600

[1] Greenwich Railway received for foot passengers £497, and toll, £4,746. [2] Grand Junction paid Liverpool and Manchester Railway £8,016, and for rent £2,093. [3] Leeds and Selby locomotive power is included in York and North Midland. [4] Brighton paid Croydon and Greenwich Railway for toll £11,109. [5] Northern and Eastern paid Eastern Counties Railway for toll £3,749. It should be observed that the office expences cannot be separated. [6] London and Birmingham paid Aylesbury Railway for rent £1,250. In addition to the total outlay there is the sum of £13,966 carried to the depreciation fund. [7] Locomotive power not kept distinct. [8] Great Western paid Bristol and Exeter and Cheltenham Railway for Rent £34,484. In addition to the outlay £5,000 is carried to the depreciation fund.

MISCELLANEA.

The Prince of Wales.—This new iron steamer, built by Messrs. Miller, Ravenhill and Co., and fitted with a pair of beam engines of 130 h.p. also by them, taken out of one of the old Margate steamers, and with new tubular boilers, is the fastest boat on the river Thames. Her symmetry calls for the admiration of all who see her, and she has made the passage from Blackwall to Margate in the astonishingly short space of 3 hours 56 minutes, true railway speed. We must not abstain from mentioning the beautiful manner in which the saloon has been decorated, and which we understand was executed by Mr. Bielefeld, with the assistance of Mr. Steedman, who painted the beautiful views adorning the sides. The accident which lately happened to the vessel was caused by one of the middle side beams of the engine breaking, and before the engine could be stopped, they made six or seven strokes, which caused part of the machinery to punch a hole through the bottom about 6 or 7 inches diameter, through which the water rushed and filled the engine room to the depth of 2 feet; but in consequence of the vessel being built with water tight bulk heads not a drop of water entered either cabin: this incident proves how desirable, nay, absolutely necessary it is that all passenger steamers should be thus built, the engine room being the compartment perhaps most liable to casualties. The vessel was immediately taken into dock and examined, the aperture quickly repaired, and when she left the dock she was reported to be as sound as when first built. Her engines also when repaired were in equal condition, and the vessel is now running again with as great success as before the casualty occurred.

The Cartoons.—The Exhibition will be closed on Saturday the 2nd inst. The premium of 300*l.* awarded to Mr. Armitage for his Cartoon, representing "Cæsar's Invasion of Britain," was withheld in consequence of the drawing having been executed in Paris; and, agreeably to the conditions originally laid down by the Commissioners, Mr. Armitage was required to execute another drawing, the subject "An Ancient Briton defending his wounded Son from the attack of a Roman Soldier." This he has done to the entire satisfaction of the Commissioners, who have now paid him the premium.

Russian Steamers.—Messrs. Rennie have just completed an order for the Russian Government consisting of an Iron Sailing Vessel, and an Iron Steamer, with a pair of 50-horse direct-action engines; the latter is a splendid specimen of workmanship, and no doubt will be equally as effective on trial as their appearance leads us to expect; both the engines and the iron steamer will be sent out in pieces in the iron sailing vessel, and put together in Russia. The steamer is intended for one of the inland lakes.

Trafalgar Square.—The bronze ornaments of the Corinthian capital of the Nelson Monument are now being fixed. The stone-work of the enclosure and the terraces are finished, and the two basins are in a forward state; they are to be supplied with water from a well, to be sunk down to the chalk at the back of the National Gallery, and which is to be forced up by engine power to the cisterns on the top of the Nationar Gallery, and thence by pipes to the fountains. The water will also be made available for other purposes, such as supplying the Gallery and Barracks, and also for watering the roads; there is some talk of suppling the public offices of Whitehall with water from the same source, which will cause a great saving to the public, as these offices are all supplied by the water companies.

THE ATMOSPHERIC RAILWAY.—We perceive by the Irish papers, that a preliminary experiment of the principle upon which the atmospheric railway is to act was made on Saturday, 19th Aug., and it is reported to have answered in every respect the expectations of the patentees, Messrs. Clegg and Samuda, as well as of all those concerned in the introduction of this most important national project into Ireland. The experiment was one made solely for the satisfaction of the engineers, the works being as yet in a very crude and imperfect state, and owing to the long continuance of dry weather there being scarcely as much water in the reservoir as would charge the boilers. At five o'clock the scientific gentlemen interested arrived, and the steam was soon after laid on, when the leviathan air pump commenced its labours—the mercury in the barometer soon displayed with what success. In sixty strokes an altitude of twenty inches was obtained, and shortly afterwards it reached twenty-two inches. This was the realization of the most sanguine expectations, and left no room for doubt as to the completeness and power of the machinery and its capability of producing sufficient vacuum. Thus far having progressed—the next course pursued was to introduce the piston into the tube at the equilibrium valve near Glasthule bridge; but while this was being done the key of the fly-wheel slipped, and a delay of nearly an hour elapsed before it was adjusted. It has been stated before that the experiment was but preliminary, and to this may be ascribed this trifling incident for accident it cannot be called. The fly-wheel movement being rectified, the engine was set going once more, but not on its condensation principle, for there was no cold water to condense. It was at high pressure and half power; the height of mercury in the gauge varied from 11 to 14 inches. The signal was given, and the piston carriage, with two passenger carriages, one second and one third class, attached, moved along *per se* amid the joyous shouts of those assembled. In four minutes they accomplished the distance, one and a quarter miles, retarded considerably at starting by the breaks on the wheels to keep the motive power under proper control, as also at the terminus, not to let the train overshoot the line of rails. A few data of the line of railway and the machinery may not be uninteresting. When finished there will be in length 9,200 feet of open or valve pipe. The close pipe forming the connexion with the air pipe is upwards of 400 yards. The engine is 100 horse power—to be worked on the expansive condensation principle. The air pump is double stroke, its diameter 67 inches; the diameter of the tube or open pipe 15 inches. The station at Dalkey is 76 feet higher than that at Kingstown. The elevation varies—1 in 57 being the greatest, 1 in 240 being the least, and the main ascent being 1 in 115. It is computed that the train will descend from Dalkey by its own gravity, at the rate of from 30 to 35 miles an hour. The sharpest curve is only 547 feet radius.

THE CATHEDRAL OF GLASGOW.—Amongst other relics which have been turned out of the cathedral in the general clearing up, there is one for which we hope a place may yet be found within the pile where it has stood, we have no doubt for much more than 1000 years. This is a large block of blue marble, 10½ feet long by 5 feet broad, and 6 inches thick, which at present lies in the churchyard. It was found in the chancel of the Old Barony Church, near the tomb of St. Mungo, and from its appearance altogether there is every probability that it has been used either as the top or the base of the high altar of the old church. The marble appears to be of the same kind as that of which the ancient tombs at Iona are formed, and probably enough came from the same quarry. There is nothing similar to it at any rate in this quarter, and the material is more durable that granite. The stone is cut as if a plate or some kind of metal or other had been sunk into it. There is another octagon altar-piece of the same material also lying outside, and in danger of being destroyed. At the period that this altar piece was discovered, namely, in 1800, there was a skeleton found in the choir, having 36 inches of a massive gold chain round the thigh bone. We trust that these relics will be preserved inviolate; indeed, we have no fear about the matter, when their supposed antiquity is known; but we have thought it our duty to direct attention to the subject, lest they should be broken up or sold, as it is said was intended. After the recent removal of the Bishop's Palace, a picturesque and most interesting ruin which stood on the banks of the Kelvin, to build a dyke for a kail-yard, we have but very little trust in some people's veneration for the antique.—*Glasgow Constitutional.*

A MONSTER BELL.—On Monday, Aug. 7, an immense bell, the largest ever cast in England, weighing no less than 7 tons, 11 cwt. 2 qrs. and 12lb., was shipped on board the Lady Seaton, bound for Montreal, and lying on the Brandy-quay, London Dock. This splendid bell, which is intended for the new Catholic cathedral at Montreal, was cast at the foundry of Messrs. Mears and Sons, Whitechapel, and has attracted, since it has been finished, the attention of a vast number of persons. Some idea may be formed of the immense size of this bell, from the fact that it required 10 tons of fused metal to form the cast, and the casting itself weighs upwards of seven tons and a half, that its diameter at the edge is seven feet three inches, that its clapper weighs upwards of 3 cwt.; the wood work, which is composed of old English oak, one ton; the iron work more than half a ton, and that the bell itself is heavier than the Great Tom of Lincoln by 32 cwt. The bell, as has been before stated, has been paid for from a fund subscribed by the merchants, artificers, agriculturists, and inhabitants of Montreal, and has cost, with its woodwork, &c., upwards of 1,200*l*. The bell was removed on a truck drawn by eight horses, from the foundry to the London Docks, preparatory to being shipped on board the Lady Seaton, but the dock officers refused to allow it to pass over the bridge leading from the West to the Brandy-quay, as they were apprehensive the structure was not sufficiently strong to support so enormous a weight without being strongly propped, and it was obliged to remain on the West-quay, until the bridge was propped up as required, and the great bell was taken safely over, and afterwards shipped on board, a part of the deck being obliged to be cut away to admit it into the hold.

THE PRINCE'S PARK, LIVERPOOL.—The prizes offered for the best designs for terraces in the Prince's Park have been awarded as follows:—For terraces A and B, to Mr. Henry Currey, of London; for terrace D, to Mr. W. Papworth, of London. The elevations for terraces A and B are very beautiful. Mr. Currey was a pupil of Mr. Decimus Burton. We understand that two of the designs for terrace D were considered of equal merit; on this being declared, Mr. Hornblower, of Liverpool, who had sent in one of those designs, handsomely withdrew from the competition, he being in the office of one of the judges.

LIST OF NEW PATENTS.

(From Messrs. Robertson's List.)

GRANTED IN ENGLAND FROM JULY 31 TO AUGUST 25, 1843.

Six Months allowed for Enrolment, unless otherwise expressed.

William Davey, of Bath, slate merchant, for "*improvements in covering the ridges and hips of roofs of buildings with slate and other materials.*"—Sealed July 31.

Charlton James Wollaston, of Welling, in the county of Kent, gentleman, for "*improvements in machinery for cutting marble and stone.*"—August 1.

Peter Borrie, of Prince's-square, St. George's in the East, engineer, and Mayer Henry, of Crutched Friars, merchant, for "*improvements in steam-engine boilers and propelling machinery.*"—August 3.

Frederic Stainer, of Hyndburn Cottage, Lancaster, Turkey red dyer, for "*a new manufacture of a certain colouring matter, commonly called garancine.*" (A communication.)—August 8.

James Home, of Regent's Park, esquire, for "*improvements in the manufacture of horse-shoes.*"—August 8.

Charles Bourjot, of Coleman-street, London, merchant, for "*improvements in apparatus for obtaining the profile of various forms or figures.*" (A communication.)—August 8.

Richard Archibald Brooman, of 166, Fleet-street, London, gentleman, for "*the manufacture of paper, cordage, matting, and other textile fabrics, from certain vegetable matters not heretofore made use of for that purpose, as also for the application of the said materials to the stuffing of cushions and mattresses.*"—August 10.

John Wood, of Parkfield, Chester, merchant, for "*improvements in machinery or apparatus for affording additional or artificial buoyancy to sea-going and other vessels, or for lessening their draught of water, and which said improvements are also applicable to raising vessels or other heavy bodies, and for securing or supporting the same.*"—August 14.

Archibald Horn, of Aldersgate-street, zinc worker, for "*improvements in the construction of shutters for windows, and other purposes.*"—August 15.

George Bennetts, of Gunnis Lake, Cornwall, civil engineer, "*for improvements in steam-engines and boilers, and in generating steam.*"—August 15.

Thomas Young, of Queen-street, merchant, for "*improvements in obtaining power.*"—August 15.

James Brown, of High-street-place, Stepney, engineer, for "*improvements in tackle and apparatus for working and using chain cables in ships and otherwise, and also improvements in the tillers of rudders of ships and other vessels.*"—August 16.

Frederick Lipscombe, of University-street, gentleman, for "*an hydrostatic engine, parts whereof are applicable as improvements to other engines and other purposes, and also improvements in railway carriages.*"—August 17.

John Collard Drake, of Elm-tree-road, Saint John's-wood, land surveyor, for "*improvements in lining walls of houses.*"—August 22.

Mark Freeman, of Sutton, gentleman, for "*improvements in card cases.*"—August 22.

Gaspare Conti, of Sherard-street, Golden-square, gentleman, for "*improvements in hydraulic machinery, to be applied as a motive power.*"—August 22.

William Fletcher, of Moreton House, Buckingham, clerk, for "*improvements for the purpose of securing corks, or substitutes for corks, in the mouths of bottles, or vessels of the nature of bottles, whether made of pottery, or of pottery of the kind called stone ware, or of glass.*"—August 24.

Alexander Connison, of Everitt-street, Brunswick-square, engineer, for "*improvements in steam-engines.*—August 24.—Dated March 3.

N.B.—This patent being opposed by caveat, lodged at the great seal office, was not sealed till the 24th of August, but bears date the 3d March last, the day the patent would have been sealed if the same had not been opposed, by order of the Lord Chancellor.

William Wilson, John Hudholme Brownrigg, John Cockerell, and Sir George Gerard de Hochepied Larpent, Bart., all of Belmont, in the Wandsworth-road, patent cocoa-nut candle and oil manufacturers, assignees of a patent granted by his late Majesty King George the Fourth, unto James Soames, jun., of Wheeler-street, Spitalfields, for "*a new preparation or manufacture of a certain material produced from a vegetable substance, and the application thereof to the purposes of affording light, and other uses.*"—For the term of three years from the 9th day of September next, the expiration of the original grant.—Aug. 24.

Bryan Corcoran, of Mark-lane, in the city of London, merchant, for "*improvements in the grinding of wheat and other substances.*—(A communication.)—Aug. 25.